LINKSYS®

A Division of Cisco Systems, Inc.

EtherFast®

Cable/DSL Router

with 8-Port Switch

User Guide

WIRED

Model No. **BEFSR81**

CISCO SYSTEMS

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How to Use this Guide

This User Guide has been designed to make understanding networking with the Router easier than ever. Look for the following items when reading this Guide:

This checkmark means there is a Note of interest and is something you should pay special attention to while using the Router.

This exclamation point means there is a Caution or Warning and is something that could damage your property or the Router.

This question mark provides you with a reminder about something you might need to do while using the Router.

In addition to these symbols, there are definitions for technical terms that are presented like this:

word: *definition.*

Also, each figure (diagram, screenshot, or other image) is provided with a figure number and description, like this:

Figure 0-1: Sample Figure Description

Figure numbers and descriptions can also be found in the “List of Figures” section in the “Table of Contents”.

Table of Contents

Chapter 1: Introduction 1
- Welcome 1
- What's in this Guide? 2

Chapter 2: Networking Basics 4
- An Introduction to LANs 4
- The Use of IP Addresses 4

Chapter 3: Getting to Know the Router 6
- The Back Panel 6
- The Front Panel 7

Chapter 4: Connecting the Router 8
- Overview 8
- Connection Instructions 9

Chapter 5: Configuring the PCs 10
- Overview 10
- Configuring Windows 98 and Millennium PCs 10
- Configuring Windows 2000 PCs 11
- Configuring Windows XP PCs 11

Chapter 6: Configuring the Router 13
- Overview 13
- Instructions 13

Chapter 7: Using The Router's Web-based Utility 17
- Overview 17
- Navigating the Utility 17
- Quick and Easy Administration 18
- Basic Setup 19
- DDNS 23
- MAC Address Clone 24
- Advanced Routing 25
- Filter 26
- VPN Passthrough 28
- Port Range Forwarding 28
- Port Triggering 29

UPnP Forwarding 30
DMZ 31
QoS 32
Management 33
Log 35
Factory Defaults 36
Firmware Upgrade 37
Router 37
Local Network 38
Appendix A: Troubleshooting 39
Common Problems and Solutions 39
Frequently Asked Questions 49
Appendix B: Upgrading Firmware 53
Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter 54
Windows 98 or Me Instructions 54
Windows 2000 or XP Instructions 54
For the Router's Web-based Utility 55
Appendix D: Windows Help 56
Appendix E: Glossary 57
Appendix F: Specifications 63
Appendix G: Warranty Information 64
Appendix H: Regulatory Information 65
Appendix I: Contact Information 66

List of Figures

Figure 3-1: Back Panel 6
Figure 3-2: Front Panel 7
Figure 4-1: Example of a Typical Network 8
Figure 4-2: Connect a PC 9
Figure 4-3: Connect the Power 9
Figure 5-1: TCP/IP for Windows 98 and Me 10
Figure 5-2: Obtain an IP address automatically for Windows 98 and Me 10
Figure 5-3: Internet Protocol (TCP/IP) for Windows 2000 11
Figure 5-4: Obtain an IP address automatically for Windows 2000 11
Figure 5-5: Internet Protocol (TCP/IP) for Windows XP 12
Figure 5-6: Obtain an IP address automatically for Windows XP 12
Figure 6-1: Router's IP Address for Basic Setup 13
Figure 6-2: Router Login for Basic Setup 13
Figure 6-3: Obtain an IP Automatically for Basic Setup 14
Figure 6-4: Static IP for Basic Setup 14
Figure 6-5: PPPoE for Basic Setup 15
Figure 6-6: RAS (for SingTel) for Basic Setup 15
Figure 6-7: PPTP for Basic Setup 16
Figure 6-8: Heart Beat Signal for Basic Setup 16
Figure 6-9: Router Registration for Basic Setup 16
Figure 7-1: Router's IP Address 18
Figure 7-2: Router Login 18
Figure 7-3: Obtain an IP Automatically 19
Figure 7-4: Static IP 19
Figure 7-5: PPPoE 20
Figure 7-6: RAS (for Singtel) 20
Figure 7-7: PPTP 21
Figure 7-8: Heart Beat Signal 22

Figure 7-9: DDNS Disabled 23
Figure 7-10: DDNS Using DynDNS.org 24
Figure 7-11: DDNS Using TZO.com 24
Figure 7-12: MAC Clone 25
Figure 7-13: Advanced Routing 25
Figure 7-14: Routing Table 26
Figure 7-15: Filter 27
Figure 7-16: MAC Filter Setting 27
Figure 7-17: VPN Passthrough 28
Figure 7-18: Port Range Forwarding 28
Figure 7-19: Port Triggering 29
Figure 7-20: UPnP Forwarding 30
Figure 7-21: DMZ 32
Figure 7-22: QoS 32
Figure 7-23: Management 33
Figure 7-24: Log 35
Figure 7-25: Incoming Log Table 36
Figure 7-26: Outgoing Log Table 36
Figure 7-27: System Log 36
Figure 7-28: Factory Defaults 36
Figure 7-29: Firmware Upgrade 37
Figure 7-30: Router 37
Figure 7-31: Local Network 38
Figure 7-32: DHCP Active IP Table 38
Figure B-1: Upgrade Firmware 53
Figure C-1: IP Configuration Screen 54
Figure C-2: MAC Address/Adapter Address 54
Figure C-3: MAC Address/Physical Address 55
Figure C-4: MAC Address Filter 55
Figure C-5: MAC Address Clone 55

Chapter 1: Introduction

Welcome

Thank you for choosing the EtherFast Cable/DSL Router with 8-Port Switch. This Router will allow your computers to share a high-speed Internet connection as well as resources, including files and printers.

How does the Router do all of this? By connecting your computers and peripherals to the Router and connecting the Router to your cable or DSL modem, then the Router can direct and control communications for your network.

But what does all of this mean?

Networks are useful tools for sharing computer resources. You can access one printer from different computers and access data located on another computer's hard drive. Networks are even used for playing multiplayer video games. So, networks not only are useful in homes and offices, but also can be fun.

PCs on a wired network create a LAN, or Local Area Network. They are connected with Ethernet cables, which is why the network is called "wired".

To create your network, install and set up the Router. To guide you through the process, Linksys strongly recommends that you run the Setup Wizard on the Setup CD-ROM. If you prefer to manually set up the Router, use the instructions in the Quick Installation or this User Guide to help you. These instructions should be all you need to get the most out of the Router.

LAN (Local Area Network): *the computers and networking products that make up the network in your home or office.*

Ethernet: *an IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium.*

What's in this Guide?

This user guide covers the basic steps for setting up a network with a router. After going through "Chapter 3: Getting to Know the Router," most users will only need to use the following chapters:

- Chapter 4: Connecting the Router
  This chapter instructs you on how to connect the cable or DSL modem to the Router and connect the PC(s) to the Router.

- Chapter 5: Configuring the PCs
  This chapter instructs you on how to configure your PC(s) for a DHCP connection, if the network settings are not already set to DHCP.

- Chapter 6: Configuring the Router
  This chapter explains how to configure the Router using your web browser and the Router's Web-based Utility. You will configure the Router using the settings provided by your ISP.

When you're finished with the basic steps, then you are ready to connect to the Internet.

You also have other chapter available for reference:

- Chapter 1: Introduction
  This chapter describes the Router's applications and this User Guide.

- Chapter 2: Networking Basics
  This chapter briefly explains how a network functions.

- Chapter 7: Using the Router's Web-based Utility
  This chapter describes the Web-based Utility and the features available, so you can use and alter advanced configuration settings.

- Appendix A: Troubleshooting
  This appendix describes some possible problems and solutions, as well as frequently asked questions, regarding installation and use of the Router.

- Appendix B: Upgrading Firmware
  This appendix explains how you can upgrade the Router's firmware.

- Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter
  This appendix instructs you on how to find the MAC address or Ethernet address of your PC's Ethernet network adapter.

- Appendix D: Windows Help
  This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.

- Appendix E: Glossary
  This appendix gives a brief glossary of terms frequently used in networking.

- Appendix F: Specifications
  This appendix provides the technical specifications for the Router.

- Appendix G: Warranty Information
  This appendix supplies the warranty information for the Router.

- Appendix H: Regulatory Information
  This appendix supplies the regulatory information regarding the Router.

- Appendix J: Contact Information
  This appendix provides contact information for a variety of Linksys resources, including Technical Support.

Chapter 2: Networking Basics

An Introduction to LANs

Simply put, a router is a network device that connects two networks together.

The Router connects your local area network (LAN), or the group of PCs in your home or office, to the Internet. The Router processes and regulates the data that travels between these two networks.

The Router's Network Address Translation (NAT) technology protects your network of PCs so users on the Internet cannot "see" your PCs. This is how your LAN remains private. The Router protects your network by inspecting the first packet coming in through the Internet port before delivery to the final destination on one of the Ethernet ports. The Router inspects Internet port services like the web server, ftp server, or other Internet applications, and, if allowed, it will forward the packet to the appropriate PC on the LAN side.

***NAT (Network Address Translation)**: NAT technology translates IP addresses of a local area network to a different IP address for the Internet.*

The Use of IP Addresses

IP stands for Internet Protocol. Every device in an IP-based network, including PCs, print servers, and routers, requires an IP address to identify its location, or address, on the network. This applies to both the Internet and LAN connections.

There are two ways of assigning IP addresses to your network devices.

A static IP address is a fixed IP address that you assign manually to a PC or other device on the network. Since a static IP address remains valid until you disable it, static IP addressing ensures that the device assigned it will always have that same IP address until you change it. Static IP addresses are commonly used with network devices such as server PCs or print servers.

***Static IP address**: a fixed address assigned to a computer or device that is connected to a network.*

If you use the Router to share your cable or DSL Internet connection, contact your ISP to find out if they have assigned a static IP address to your account. If so, you will need that static IP address when configuring the Router. You can get the information from your ISP.

***Dynamic IP address**: a temporary IP address assigned by a DHCP server.*

A dynamic IP address is automatically assigned to a device on the network. These IP addresses are called dynamic because they are only temporarily assigned to the PC or other device. After a certain time period, they expire and may change. If a PC logs onto the network (or the Internet) and its dynamic IP address has expired, the DHCP server will assign it a new dynamic IP address.

***DHCP (Dynamic Host Configuration Protocol)**: a protocol that lets one device on a local network, known as a DHCP server, assign temporary IP addresses to the other network devices, typically computers.*

A DHCP server can either be a designated PC on the network or another network device, such as the Router. By default, the Router's Internet Connection Type is **Obtain an IP automatically** (DHCP).

The PC or network device obtaining an IP address is called the DHCP client. DHCP frees you from having to assign IP addresses manually every time a new user is added to your network.

For DSL users, many ISPs may require you to log on with a user name and password to gain access to the Internet. This is a dedicated, high-speed connection type called Point to Point Protocol over Ethernet (PPPoE). PPPoE is similar to a dial-up connection, but PPPoE does not dial a phone number when establishing a connection. It also will provide the Router with a dynamic IP address to establish a connection to the Internet.

By default, a DHCP server (on the LAN side) is enabled on the Router. If you already have a DHCP server running on your network, you MUST disable one of the two DHCP servers. If you run more than one DHCP server on your network, you will experience network errors, such as conflicting IP addresses. To disable DHCP on the Router, see the Basic Setup section in "Chapter 7: Using the Router's Web-based Utility."

Chapter 3: Getting to Know the Router

The Back Panel

The Router's ports and the Reset button are located on the back panel of the Router.

Figure 3-1: Back Panel

Internet This **Internet** port connects to your cable or DSL modem.

1-8 These eight **Ethernet** ports connect to network devices, such as PCs, print servers, or additional switches.

Reset Button The Reset button can be used in one of two ways:
If the Router is having problems connecting to the Internet, press the Reset button for just a second with a paper clip or a pencil tip. This is similar to pressing the Reset button on your PC to reboot it.

If you are experiencing extreme problems with the Router and have tried all other troubleshooting measures, press and hold in the Reset button for 30 seconds. This will restore the factory defaults and clear all of the Router's settings, such as port forwarding or a new password.

Power The **Power** port is where you will connect the power adapter.

The Front Panel

The Router's LEDs, which inform you about network activities, are located on the front panel.

Figure 3-2: Front Panel

QoS Green. The **QoS** LED lights up when the QoS feature is active.

Power Green. The **Power** LED lights up when the Router is powered on. If the LED is flashing, the Router is running a diagnostic test.

Ethernet Green. The **Ethernet** LED serves two purposes. If the LED is continuously lit, the Router is connected to a device through the corresponding port (1, 2, 3, 4, 5, 6, 7, or 8). If the LED is flashing, the Router is actively sending or receiving data over that port.

Internet Green. The **Internet** LED lights up when the Router is connected to your cable or DSL modem.

Proceed to "Chapter 4: Connecting the Router."

Chapter 4: Connecting the Router

Overview

To set up your network, do the following:

- Connect the Router to one of your PCs.
- If necessary, configure your PCs to obtain an IP address automatically from the Router. (By default, Windows 98, 2000, Millennium, and XP computers are set to obtain an IP address automatically, so unless you have changed the default setting, then you will not need to configure your PCs.)
- Configure the Router with the setting(s) provided by your Internet Service Provider (ISP).

The installation technician from your ISP should have left the setup information with you after installing your broadband connection. If not, you can call your ISP to request the information. Once you have the setup information for your specific type of Internet connection, then you can begin installation and setup of the Router.

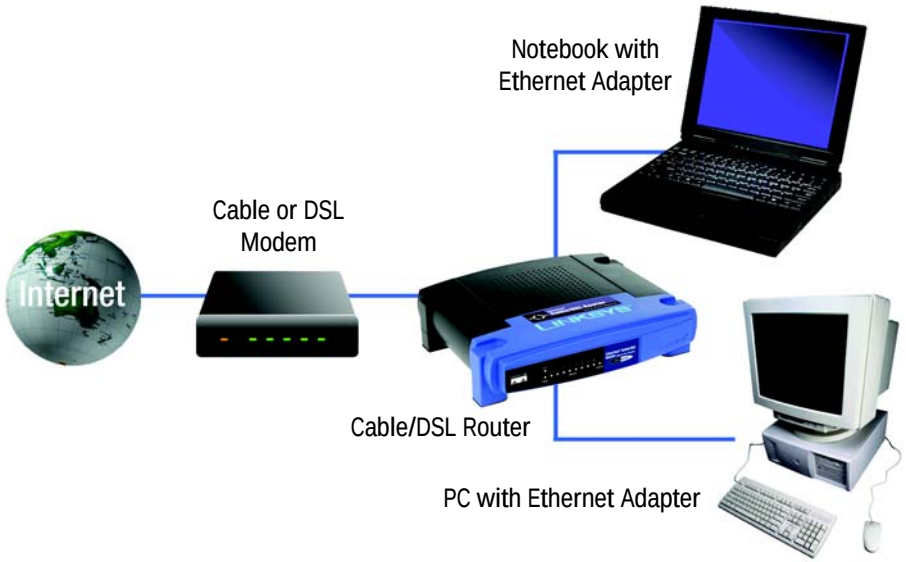

Figure 4-1: Example of a Typical Network

Connection Instructions

1. Before you begin, make sure that all of your hardware is powered off, including the Router, PCs, hubs, switches, and cable or DSL modem.

2. Connect one end of an Ethernet network cable to one of the numbered ports on the back of the Router (see Figure 4-2). Connect the other end to an Ethernet port on a network device, e.g., a PC, print server, hub, or switch.

   Repeat this step to connect more PCs or other network devices to the Router.

3. Connect your cable or DSL modem's Ethernet cable to the Router's Internet port.

4. Power on the cable or DSL modem.

5. Connect the included power adapter to the Router's Power port, as shown in Figure 4-3, and then plug the power adapter into an electrical outlet.

   The Power LED on the front panel will light up as soon as the power adapter is connected properly.

If you need to configure your PCs, proceed to "Chapter 5: Configuring the PCs." Otherwise, proceed to "Chapter 6: Configuring the Router."

Figure 4-2: Connect a PC

Figure 4-3: Connect the Power

Chapter 5: Configuring the PCs

Overview

The instructions in this chapter will help you configure each of your computers so they will be able to communicate with the Router. Each PC must be set to obtain an IP address (or TCP/IP) address automatically (called DHCP). Computers use IP addresses to communicate with each other across a network or the Internet.

Note: These instructions apply only to Windows 98, Millennium, 2000, or XP computers. By default, Windows 98, 2000, Millennium, and XP have TCP/IP installed and are set to obtain an IP address automatically. If you have not made any changes to your PC's default network settings, then proceed to "Chapter 6: Configuring the Router."

Find out which operating system your computer is running, such as Windows 98, Millennium, 2000, or XP. If you're not sure, you can find out by clicking the Start button. On the left side of the taskbar, it will say which operating system your computer is using.

You may need to do this for each computer you are connecting to the Router.

The next few pages tell you, step by step, how to configure your network settings based on the type of Windows operating system you are using. Make sure that an Ethernet card or adapter has been successfully installed in each PC you will configure. Once you've configured your computers, proceed to "Chapter 6: Configuring the Router."

Configuring Windows 98 and Millennium PCs

1. Click the **Start** button. Click **Settings** and then **Control Panel**. From there, double-click the **Network** icon.
2. On the Configuration tab, select the **TCP/IP** line for the applicable Ethernet adapter, as shown in Figure 5-1. Do not choose a TCP/IP entry whose name mentions Dial-Up Adapter, PPPoE, VPN, or AOL. If the word TCP/IP appears by itself, select that line. (If there is no TCP/IP line listed, refer to Windows Help or your Ethernet adapter's documentation to install TCP/IP now.) Click the **Properties** button.
3. Click the **IP Address** tab and select **Obtain an IP address automatically**, as shown in Figure 5-2.
4. Now click the **Gateway** tab to ensure that the *Installed Gateway* field is left blank. Click the **OK** button.

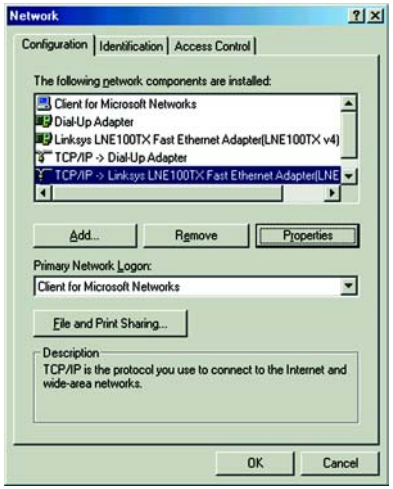

Figure 5-1: TCP/IP for Windows 98 and Me

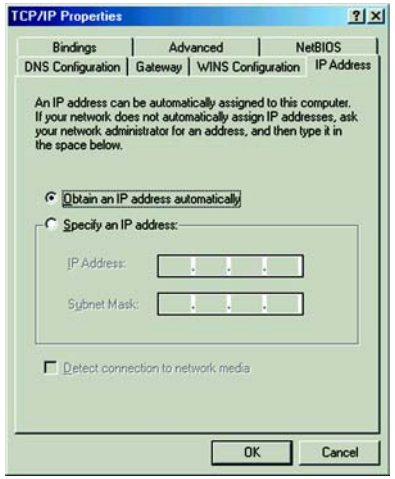
TCP/IP Properties
Bindings
Advanced
NetBIOS
DNS Configuration
Gateway
WINS Configuration
IP Address
An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.
Obtain an IP address automatically
Specify an IP address:
IP Address:
Subnet Mask:
Detect connection to network media
OK
Cancel

Figure 5-2: Obtain an IP address automatically for Windows 98 and Me

5. Click the **OK** button again. Windows may ask you for the original Windows installation disk or additional files. Supply them by pointing to the correct file location, e.g., D:\win98, D:\win9x, c:\windows\options\cabs, etc. (if "D" is the letter of your CD-ROM drive).

6. Windows may ask you to restart your PC. Click the **Yes** button. If Windows does not ask you to restart, restart your computer anyway.

Go to "Chapter 6: Configuring the Router."

Configuring Windows 2000 PCs

1. Click the **Start** button. Click **Settings** and then **Control Panel**. From there, double-click the **Network and Dial-up Connections** icon.

2. Select the **Local Area Connection** icon for the applicable Ethernet adapter (usually it is the first Local Area Connection listed). Double-click the **Local Area Connection**. Click the **Properties** button.

3. Select **Internet Protocol (TCP/IP)**, and click the **Properties** button. See Figure 5-3.

4. Select **Obtain an IP address automatically** (see Figure 5-4). Once the new windows appears, click the **OK** button. Click the **OK** button again to complete the PC configuration.

5. Restart your computer.

Go to "Chapter 6: Configuring the Router."

Configuring Windows XP PCs

The following instructions assume you are running Windows XP with the default interface. If you are using the Classic interface (where the icons and menus look like previous Windows versions), follow the instructions for Windows 2000.

1. Click the **Start** button. Click **Settings** and then **Control Panel**. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.

2. Select the **Local Area Connection** icon for the applicable Ethernet adapter (usually it is the first Local Area Connection listed). Double-click the **Local Area Connection**. Click the **Properties** button.

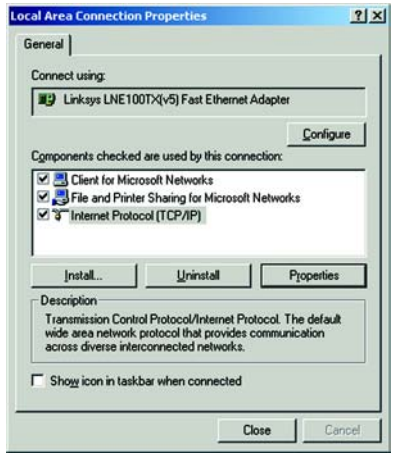

Figure 5-3: Internet Protocol (TCP/IP) for Windows 2000

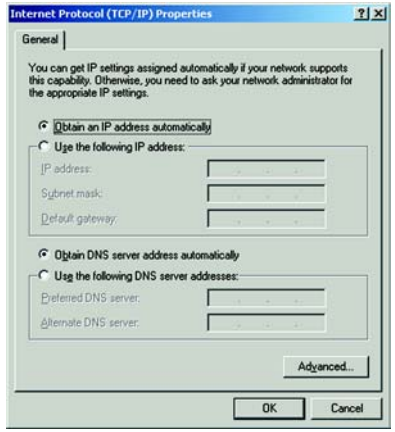
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 5-4: Obtain an IP address automatically for Windows 2000

3. Select **Internet Protocol (TCP/IP)**, and click the **Properties** button. See Figure 5-5.

4. Select **Obtain an IP address automatically** (see Figure 5-6). Once the new window appears, click the **OK** button. Click the **OK** button again (or the **Close** button if any settings were changed) to complete the PC configuration.

5. Restart your computer.

Go to "Chapter 6: Configuring the Router."

Figure 5-5: Internet Protocol (TCP/IP) for Windows XP

Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 5-6: Obtain an IP address automatically for Windows XP

Chapter 6: Configuring the Router

Note: Linksys recommends using the Setup CD-ROM for first-time installation of the Router and setting up additional computers. If you do not wish to run the Setup Wizard on the Setup CD-ROM, then follow the steps in this chapter.

Overview

The instructions from your ISP tell you how to set up your PC for Internet access. Because you are now using the Router to share Internet access among several computers, you will use the setup information to configure the Router instead of your PC.

This chapter will show you how to configure the Router. Detailed descriptions of the Router's Web-based Utility can be found in "Chapter 7: Using the Router's Web-based Utility." You will set the Internet Connection Type on the Router's *Basic Setup* screen based on the information provided by your Internet Service Provider (ISP), who may also require use of a Host Name and Domain Name. If you do not have this setup information, contact your ISP before proceeding.

Instructions

1. Open your web browser. Enter **http://192.168.1.1** in the web browser's *Address* field, as shown in Figure 6-1. Press the **Enter** key.

2. A screen will appear asking you for your User name and Password (see Figure 6-2). Leave the *User name* field blank, and enter the default password, **admin**, in lowercase letters in the *Password* field. Then click the **OK** button.

3. The Router supports six connection types: obtain an IP automatically (DHCP), Static IP, PPPoE, RAS, PPTP, and Heart Beat Signal. These types are listed in the drop-down menu for the Internet Connection Type setting of the Internet Setup section. Each *Basic Setup* screen and available features will differ depending on what kind of connection type you select. Proceed to the instructions for the connection type you are using. When you are finished with the Internet Setup section, proceed to step 4.

Figure 6-1: Router's IP Address for Basic Setup

Figure 6-2: Router Login for Basic Setup

Note: If you have previously enabled Internet-sharing proxy server software on any of your PCs, you must disable it now. Some examples of Internet-sharing software are Internet LanBridge, Wingate, ICS, and Sygate.

To disable your Internet sharing software:

- If you are running Netscape Navigator, click **Edit** >> **Preferences** >> **Advanced** >> **Proxies**. Click **Direct Connection to the Internet**.
- If you are running Internet Explorer 5.x or higher, click **Start** >> **Settings** >> **Control Panel** >> **Internet Options** >> **Connections** >> **LAN Settings**. Remove checkmarks from all three boxes. Click the **OK** button to continue.

Also, you must disable any Internet log-on software, such as Ivasion Winpoet or Enternet 300, on all of your PCs.

Obtain an IP Automatically or DHCP

If your ISP says that you are connecting through DHCP or a dynamic IP address from your ISP, perform these steps:

A Select **Obtain an IP automatically** as the Internet Connection Type, as shown in Figure 6-3.

B Click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button. When you are finished, proceed to step 4.

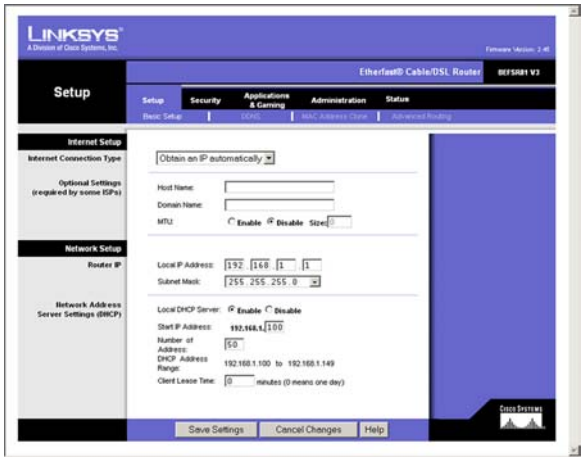

Figure 6-3: Obtain an IP Automatically for Basic Setup

Static IP

If your ISP says that you are connecting through a static or fixed IP address from your ISP, perform these steps:

A Select **Static IP** as the Internet Connection Type, as shown in Figure 6-4.

B Enter the IP Address, Subnet Mask, and Default Gateway.

C Enter the DNS in the *Primary DNS* and/or *Secondary DNS* fields. You need to enter at least one DNS address.

D Click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button. When you are finished, proceed to step 4.

Figure 6-4: Static IP for Basic Setup

PPPoE

If your ISP says that you are connecting through a PPPoE or you normally enter a user name and password to access the Internet, perform these steps:

A Select **PPPoE** as the Internet Connection Type, as shown in Figure 6-5.

B Enter the User Name and Password.

C Click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button.

D Click the **Status** tab, and then click the **Connect** button. When you are finished, proceed to step 4.

RAS

RAS (shown in Figure 6-6) is a service used in Singapore only. If you are using a RAS connection, check with your ISP for the necessary setup information.

A When finished making your changes on this tab, click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button.

B Click the **Status** tab, and then click the **Connect** button. When you are finished, proceed to step 4.

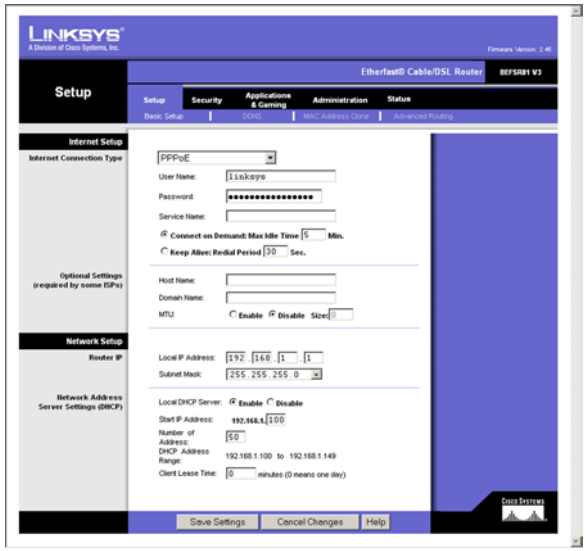

Figure 6-5: PPPoE for Basic Setup

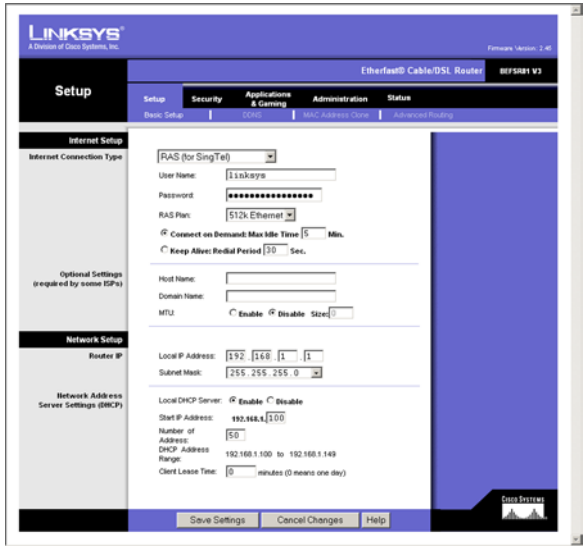

Figure 6-6: RAS (for SingTel) for Basic Setup

PPTP

PPTP (shown in Figure 6-7) is a service used in Europe and Israel only. If you are using a PPTP connection, check with your ISP for the necessary setup information.

A When finished making your changes on this tab, click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button.

B Click the **Status** tab, and then click the **Connect** button. When you are finished, proceed to step 4.

Heart Beat Signal

Heart Beat Signal (shown in Figure 6-8) is a service used in Australia only. If you are using a Heart Beat Signal connection, check with your ISP for the necessary setup information.

A When finished making your changes on this tab, click the **Save Settings** button to save this change, or click the **Cancel Changes** button to undo your change. For further help on this tab, click the **Help** button.

B Click the **Status** tab, and then click the **Connect** button. When you are finished, proceed to step 4.

4. In the Optional Settings section, you may need to provide a Host Name and Domain Name for the Router. These fields are usually left blank. If requested by your ISP (usually cable ISPs), complete these two fields.

5. If you haven't already done so, click the **Save Settings** button to save your settings. Close the web browser.

6. Reset the power on your cable or DSL modem.

7. Restart your computers so that they can obtain the Router's new settings.

8. Congratulations! You've successfully configured the Router. Test the setup by opening your web browser from any computer and entering *www.linksys.com/registration*, as shown in Figure 6-9.

Figure 6-9: Router Registration for Basic Setup

If you are unable to reach our website, you may want to review what you did in this section or refer to "Appendix A: Troubleshooting."

If you need advanced setting information, refer to "Chapter 7: Using the Router's Web-based Utility" or the Linksys support website at *support.linksys.com*.

Figure 6-7: PPTP for Basic Setup

Figure 6-8: Heart Beat Signal for Basic Setup

Chapter 7: Using The Router's Web-based Utility

Overview

For your convenience, use the Router's Web-based Utility to administer it. This chapter will explain all of the functions in this Utility. The Utility can be accessed via Microsoft Internet Explorer or Netscape Navigator through use of a computer connected with an Ethernet cable to the Router.

For a basic network setup, most users only have to use the following screens of the Utility:

- Basic Setup
  On the *Basic Setup* screen, enter the settings provided by your ISP.
- Management
  Click the **Administration** tab and then the **Management** tab. The Router's default password is **admin**. To secure the Router, change the Password from its default.

Navigating the Utility

There are five main tabs: Setup, Security, Applications & Gaming, Administration, and Status. Additional tabs will be available after you click one of the main tabs.

Setup

- Basic Setup. Enter the Internet connection and network settings on this screen.
- DDNS. To enable the Router's Dynamic Domain Name System (DDNS) feature, complete the fields on this screen.
- MAC Address Clone. If you need to clone a MAC address onto the Router, use this screen.
- Advanced Routing. On this screen, you can alter Network Address Translation (NAT), Dynamic Routing, and Static Routing configurations.

Security

- Filter. To block specific users from Internet access, you can set up IP address, port, and MAC address filtering on the *Filter* screen.

- VPN Passthrough. To enable or disable IPSec, PPPoE, and/or PPTP Passthrough, use this screen.

Applications & Gaming

- Port Range Forwarding. To set up public services or other specialized Internet applications on your network, click this tab.
- Port Triggering. To set up triggered ranges and forwarded ranges for Internet applications, click this tab.
- UPnP Forwarding. Use this screen to alter UPnP forwarding settings.
- DMZ. To allow one local user to be exposed to the Internet for use of special-purpose services, use this screen.
- QoS. Enable QoS (Quality of Service) to maximize network performance.

Administration

- Management. On this screen, alter the Router's password, access privileges, and UPnP settings.
- Log. If you want to view or save activity logs, click this tab.
- Factory Defaults. If you want to restore the Router's factory defaults, then use this screen.
- Firmware Upgrade. Click this tab if you want to upgrade the Router's firmware.

Status

- Router. This screen provides status information about the Router.
- Local Network. This provides status information about the local network.

Quick and Easy Administration

To access the Web-based Utility of the Router, launch Internet Explorer or Netscape Navigator, and enter the Router's default IP address, **192.168.1.1**, in the *Address* field, as shown in Figure 7-1. Press the **Enter** key.

A screen will appear asking you for your User name and Password, as shown in Figure 7-2. Leave the *User name* field blank, and enter **admin** in the *Password* field. Then click the **OK** button.

Figure 7-1: Router's IP Address

Figure 7-2: Router Login

When finished making your changes on a tab, click the **Save Settings** button to save the changes, or click the **Cancel Changes** button to undo your changes. For further help on the tab, click the **Help** button.

Basic Setup

The *Basic Setup* screen is the first screen you see when you access the Web-based Utility.

Internet Setup

Internet Connection Type

The Router supports six connection types: Obtain an IP automatically (DHCP), Static IP, PPPoE, RAS, PPTP, and Heart Beat Signal. Each *Basic Setup* screen and available features will differ depending on what kind of connection type you select.

Obtain an IP automatically

By default, the Router's Internet Connection Type is set to **Obtain an IP automatically**, as shown in Figure 7-3, and it should be used only if your ISP supports DHCP.

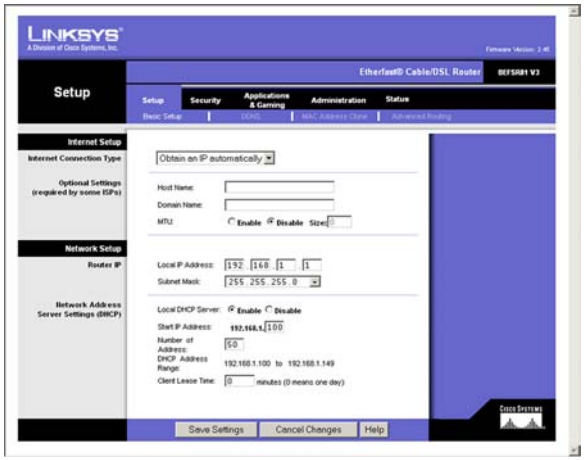

Figure 7-3: Obtain an IP Automatically

Static IP

If you are required to use a permanent IP address, then select **Static IP**, as shown in Figure 7-4.

Figure 7-4: Static IP

- IP Address. This is the IP address that the Router has, when seen from the Internet. Your ISP will provide you with the IP Address you need to specify here.
- Subnet Mask. This is the Router's Subnet Mask, as seen by external users on the Internet (including your ISP). Your ISP will provide you with the Subnet Mask.
- Default Gateway. Your ISP will provide you with the Default Gateway Address.
- Primary DNS and Secondary DNS. Your ISP will provide you with at least one DNS (Domain Name System) Server IP Address.

PPPoE

Some DSL-based ISPs use PPPoE (Point-to-Point Protocol over Ethernet) to establish Internet connections for end-users. If you use a DSL line, check with your ISP to see if they use PPPoE. If they do, you will have to enable it, as shown in Figure 7-5.

- User Name and Password. Enter the User Name and Password provided by your ISP.
- Service Name. If provided by your ISP, enter the Service Name.
- Connect on Demand and Max Idle Time. You can configure the Router to cut your connection with your ISP after a specified period of time (Max Idle Time). If you have been disconnected due to inactivity, Connect on Demand enables the Router to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate Connect on Demand, click the radio button. If you want your Internet connection to remain on at all times, enter **0** in the *Max Idle Time* field. Otherwise, enter the number of minutes you want to have elapsed before your Internet access disconnects.
- Keep Alive Option and Redial Period. This option keeps your PPPoE-enabled Internet access connected indefinitely, even when it sits idle. To use this option, click the radio button next to *Keep Alive*. The default Redial Period is 30 seconds.

Note: For DSL users, if you need to enable PPPoE support, remember to remove any PPPoE applications that are installed on your PCs.

When you are finished, click the **Save Settings** button. Then click the **Status** tab, and click the **Connect** button to start the connection.

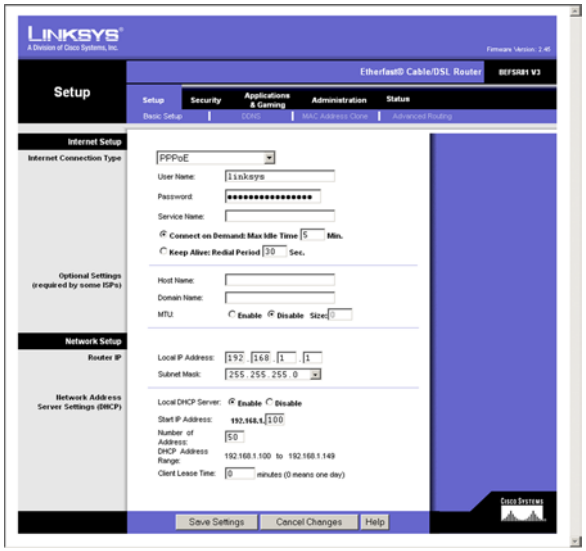

Figure 7-5: PPPoE

RAS (for SingTel)

Remote Access Service (RAS) (shown in Figure 7-6) is a service that applies to connections in Singapore only. For users in Singapore, check with Singtel for information on RAS.

- User Name and Password. Enter the User Name and Password supplied by Singtel.
- RAS Plan. Select the type of plan you have.
- Connect on Demand and Max Idle Time. You can configure the Router to cut your connection with your ISP after a specified period of time (Max Idle Time). If you have been disconnected due to inactivity, Connect on Demand enables the Router to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate Connect on Demand, click the radio button. If you want your Internet connection to remain on at all times, enter **0** in the *Max Idle Time* field. Otherwise, enter the number of minutes you want to have elapsed before your Internet access disconnects.

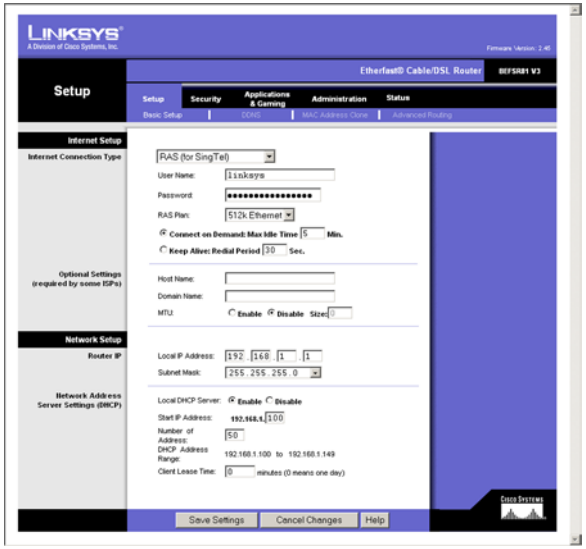

Figure 7-6: RAS (for Singtel)

- Keep Alive Option and Redial Period. This option keeps your RAS-enabled Internet access connected indefinitely, even when it sits idle. To use this option, click the radio button next to *Keep Alive*. The default Redial Period is 30 seconds.

When you are finished, click the **Save Settings** button. Then click the **Status** tab, and click the **Connect** button to start the connection.

PPTP

Point to Point Tunneling Protocol (PPTP), shown in Figure 7-7, is a service that applies to connections in Europe and Israel only.

Figure 7-7: PPTP

- IP Address. This is the IP address that the Router has, when seen from the Internet. Your ISP will provide you with the IP Address you need to specify here.

- Subnet Mask. This is the Router's Subnet Mask, as seen by external users on the Internet (including your ISP). Your ISP will provide you with the Subnet Mask.

- Default Gateway. Your ISP will provide you with the Default Gateway Address.

- User Name and Password. Enter the User Name and Password provided by your ISP.

- Connect on Demand and Max Idle Time. You can configure the Router to cut your connection with your ISP after a specified period of time (Max Idle Time). If you have been disconnected due to inactivity, Connect on Demand enables the Router to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate Connect on Demand, click the radio button. If you want your Internet connection to remain on at all times, enter **0** in the *Max Idle Time* field. Otherwise, enter the number of minutes you want to have elapsed before your Internet access disconnects.

- Keep Alive Option and Redial Period. This option keeps your PPTP-enabled Internet access connected indefinitely, even when it sits idle. To use this option, click the radio button next to *Keep Alive*. The default Redial Period is 30 seconds.

When you are finished, click the **Save Settings** button. Then click the **Status** tab, and click the **Connect** button to start the connection.

Heart Beat Signal

Heart Beat Signal (shown in Figure 7-8) is a service used in Australia only. If you are using a Heart Beat Signal connection, check with your ISP for the necessary setup information.

- User Name and Password. Enter the User Name and Password provided by your ISP.
- Heart Beat Server. This is the IP address that the Router has, when seen from the Internet. Your ISP will provide you with the IP Address you need to specify here.
- Connect on Demand and Max Idle Time. You can configure the Router to cut your connection with your ISP after a specified period of time (Max Idle Time). If you have been disconnected due to inactivity, Connect on Demand enables the Router to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate Connect on Demand, click the radio button. If you want your Internet connection to remain on at all times, enter 0 in the *Max Idle Time* field. Otherwise, enter the number of minutes you want to have elapsed before your Internet access disconnects.
- Keep Alive Option and Redial Period. This option keeps your PPPoE-enabled Internet access connected indefinitely, even when it sits idle. To use this option, click the radio button next to *Keep Alive*. The default Redial Period is 30 seconds.

When you are finished, click the **Save Settings** button. Then click the **Status** tab, and click the **Connect** button to start the connection.

Figure 7-8: Heart Beat Signal

Optional Settings

- Host Name and Domain Name. These fields allow you to supply a host and domain name for the Router. Some ISPs require these names as identification. You may have to check with your ISP to see if your broadband Internet service has been configured with a host and domain name. In most cases, leaving these fields blank will work.
- MTU. The MTU (Maximum Transmission Unit) setting specifies the largest packet size permitted for network transmission. Select **Enable** and enter the value desired. It is recommended that you leave this value in the 1200 to 1500 range. For most DSL users, it is recommended to use the value 1492. By default, MTU is set at 1500 when disabled.

Network Setup

Router IP

The values for the Router's Local IP Address and Subnet Mask are shown here. In most cases, keeping the default values will work.

- Local IP Address. The default value is **192.168.1.1**.
- Subnet Mask. The default value is **255.255.255.0**.

Network Address Server Settings (DHCP)

A Dynamic Host Configuration Protocol (DHCP) server automatically assigns an IP address to each PC on your network for you. Unless you already have one, it is highly recommended that you leave the Router enabled as a DHCP server.

- Local DHCP Server. DHCP is already enabled by factory default. If you already have a DHCP server on your network, set the Router's DHCP option to **Disable**. If you disable DHCP, remember to assign a static IP address to the Router.
- Start IP Address. Enter a value for the DHCP server to start with when issuing IP addresses. This value must be 192.168.1. 2 or greater, because the default IP address for the Router is 192.168.1.1.
- Number of Address (Optional). Enter the maximum number of PCs that you want the DHCP server to assign IP addresses to. This number cannot be greater than 253. In order to determine the DHCP IP Address range, add the starting IP address (e.g., 100) to the number of DHCP users. By default, as shown in Figure 7-8, add 100 to 50, and the range is 192.168.1.100 to 192.168.1.149.
- DHCP Address Range. The range of DHCP addresses is displayed here.
- Client Lease Time. The Client Lease Time is the amount of time a network user will be allowed connection to the Router with their current dynamic IP address. Enter the amount of time, in minutes, that the user will be "leased" this dynamic IP address.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Note: To test your settings, connect to the Internet now.

DDNS

The Router offers a Dynamic Domain Name System (DDNS) feature. DDNS lets you assign a fixed host and domain name to a dynamic Internet IP address. It is useful when you are hosting your own website, FTP server, or other server behind the Router.

Before you can use this feature, you need to sign up for DDNS service at one of two DDNS service providers, DynDNS.org or TZO.com. If you do not want to use this feature, keep the default setting, **Disable**.

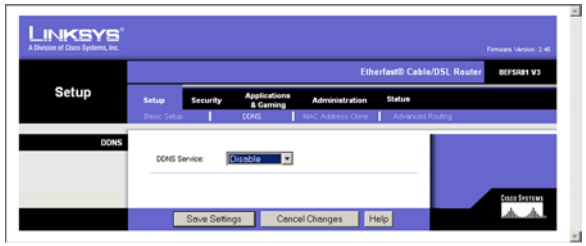

Figure 7-9: DDNS Disabled

DDNS

- DDNS Service. If your DDNS service is provided by DynDNS.org, then select **DynDNS.org** from the drop-down menu. If your DDNS service is provided by TZO, then select **TZO.com**. The features available on the *DDNS* screen will vary, depending on which DDNS service provider you use.

DynDNS.org

- User Name, Password, and Host Name. Enter the User Name, Password, and Host Name of the account you set up with DynDNS.org. See Figure 7-10.
- Internet IP Address. The Router's current Internet IP Address is displayed here. Because it is dynamic, it will change.
- Status. The status of the DDNS service connection is displayed here.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Figure 7-10: DDNS Using DynDNS.org

TZO.com

- Email Address, TZO Password Key, and Domain Name. Enter the Email Address, TZO Password Key, and Domain Name of the service you set up with TZO. See Figure 7-11.
- Internet IP Address. The Router's current Internet IP Address is displayed here. Because it is dynamic, this will change.
- Status. The status of the DDNS service connection is displayed here.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Figure 7-11: DDNS Using TZO.com

MAC Address Clone

The Router's MAC address is a 12-digit code assigned to a unique piece of hardware for identification, like a social security number. If your ISP requires MAC address registration, find your adapter's MAC address by following the instructions in "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."

MAC Clone

- MAC Clone Service To use MAC address cloning, select **Enable**. See Figure 7-12.
- MAC Address. To manually clone a MAC address, enter the 12 digits of your adapter's MAC address in the on-screen fields. Then click the **Save Settings** button.
- Clone. If you want to clone the MAC address of the PC you are currently using to configure the Router, then click the **Clone** button. The Router will automatically detect your PC's MAC address, so you do NOT have to call your ISP to change the registered MAC address to the Router's MAC address. It is recommended that the PC registered with the ISP is used to open the *MAC Address Clone* screen.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

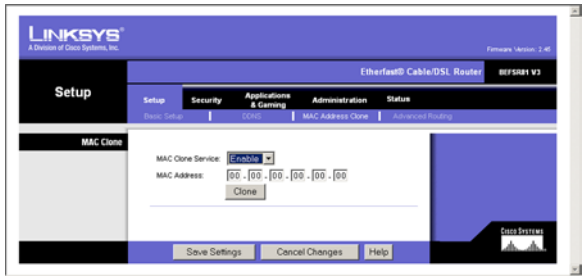

Figure 7-12: MAC Clone

Advanced Routing

The *Advanced Routing* screen, shown in Figure 7-13, allows you to configure the Network Address Translation (NAT), dynamic routing, and static routing settings.

Advanced Routing

- NAT. NAT is a security feature that is enabled by default. It enables the Router to translate IP addresses of your local area network to a different IP address for the Internet. To disable NAT, click the **Disable** radio button. (When NAT is disabled, the DHCP server feature is also disabled.)
- Dynamic Routing. With Dynamic Routing you can enable the Router to automatically adjust to physical changes in the network's layout. The Router, using the RIP protocol, determines the network packets' route based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other routers on the network.
    - Transmit RIP Version. To use dynamic routing for transmission of network data select the protocol you want: **RIP1**, **RIP1-Compatible**, or **RIP2**.
    - Receive RIP Version. To use dynamic routing for reception of network data, select the protocol you want: **RIP1** or **RIP2**.
- Static Routing. If the Router is connected to more than one network, it may be necessary to set up a static route between them. A static route is a pre-determined pathway that network information must travel to reach a specific host or network. To create a static route, alter the following settings:

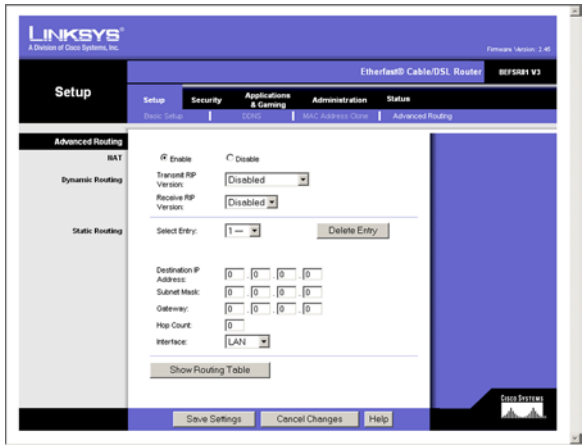

Figure 7-13: Advanced Routing

- Select Entry. Select the number of the static route from the drop-down menu. The Router supports up to 20 static route entries.
- Delete Entry. If you need to delete a route, select its number from the drop-down menu, and click the **Delete Entry** button.
- Destination IP Address. The Destination IP Address is the address of the remote network or host to which you want to assign a static route. Enter the IP address of the host for which you wish to create a static route. If you are building a route to an entire network, be sure that the network portion of the IP address is set to 0. For example, the Router's standard IP address is 192.168.1.1. Based on this address, the address of the routed network is 192.168.1, with the last digit determining the Router's place on the network. Therefore you would enter the IP address 192.168.1.0 if you wanted to route to the Router's entire network, rather than just to the Router.
- Subnet Mask. The Subnet Mask (also known as the Network Mask) determines which portion of an IP address is the network portion, and which portion is the host portion. Take, for example, a network in which the Subnet Mask is 255.255.255.0. This determines (by using the values 255) that the first three numbers of a network IP address identify this particular network, while the last digit (from 1 to 254) identifies the specific host.
- Gateway. This IP address should be the IP address of the gateway device that allows for contact between the Router and the remote network or host.
- Hop Count. This determines the maximum number of steps between network nodes that data packets will travel. A node is any device on the network, such as PCs, print servers, routers, etc.
- Interface. Select **LAN** or **Internet**, depending on the location of the static route's final destination.

- Show Routing Table. Click the **Show Routing Table** button to open a screen displaying how data is routed through your LAN. For each route, the Destination LAN IP address, Subnet Mask, Default Gateway, Hop Count, and Interface are displayed. Click the **Refresh** button to update the information. See Figure 7-14.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

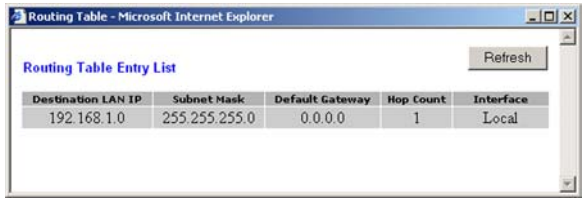

Figure 7-14: Routing Table

Filter

When you click the Security tab, you will see the *Filter* screen (see Figure 7-15). Filters block specific internal users from accessing the Internet and block anonymous Internet requests and/or multicasting.

Filter IP Address Range

To set up a filter using IP addresses, enter the range of IP addresses you wish to filter in the *Start* and *End* fields. Users who have filtered IP addresses will not be able to access the Internet at all. If you only want to filter one IP address instead of a range of IP addresses, enter the same value into both fields. For instance, if you wish to filter the PC with the IP address of 192.168.1.5, enter **5** into both fields on one line: 192.168.1.**5** ~ 192.168.1.**5**.

Filter Port Range

To filter users by network port number, select the protocol you want to filter, **TCP**, **UDP**, or **Both**, in the *Protocol* drop-down box. Enter the port numbers you want to filter in the *Start* and *End* fields. Users connected to the Router will no longer be able to access any port number listed there.

Filter MAC Address

This feature blocks computers with specific MAC addresses from going out to the Internet. For information on obtaining a MAC address, go to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter." To set the MAC filter, click the **Edit MAC Filter Setting** button.

- Edit MAC Filter Setting. Click the **Edit MAC Filter Setting** button to display Figure 7-16. Select the range of MAC address entries in the drop-down box. In each *mac* field, enter the MAC address you want to filter. Click the **Apply** button before closing the window. To cancel changes, click the **Undo** button.

Block WAN Requests

Use these features to enhance your network's security and filter multicasting.

- Block Anonymous Internet Requests. This keeps your network from being "pinged" or detected and reinforces your network security by hiding your network ports, so it is more difficult for intruders to work their way into your network. Select **Enabled** to block anonymous Internet requests, or **Disabled** to allow anonymous Internet requests.
- Filter Multicast. Multicasting allows for multiple transmissions to specific recipients at the same time. If multicasting is permitted, then the Router will allow IP multicast packets to be forwarded to the appropriate computers. Select **Enabled** to filter multicasting, or **Disabled** to disable this feature.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

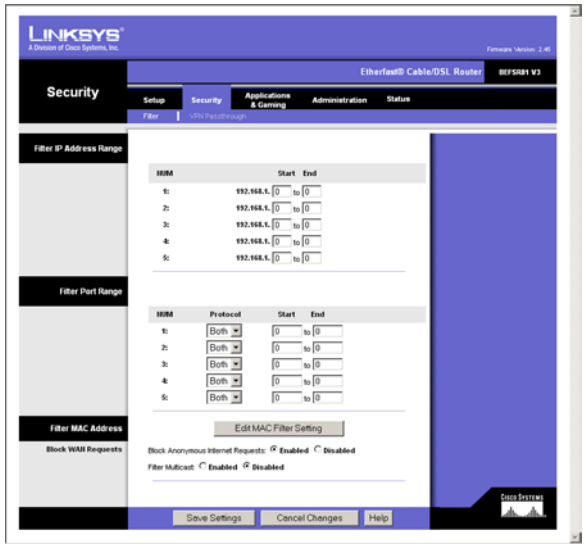

Figure 7-15: Filter

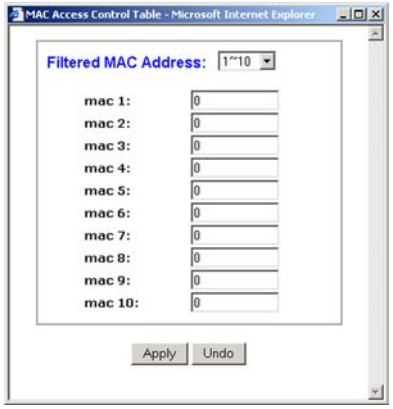

Figure 7-16: MAC Filter Setting

VPN Passthrough

The *VPN Passthrough* screen allows you to enable or disable passthrough for a variety of VPN methods. See Figure 7-17.

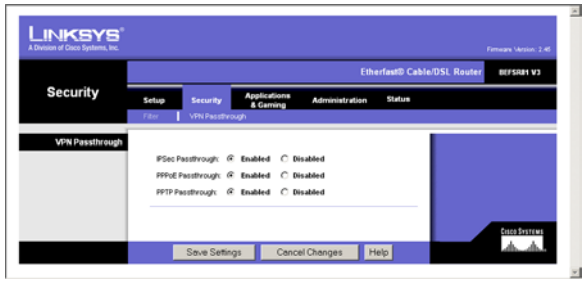

Figure 7-17: VPN Passthrough

VPN Passthrough

- IPSec Passthrough. Internet Protocol Security (IPSec) is a suite of protocols used to implement secure exchange of packets at the IP layer. To allow IPSec Passthrough, click the **Enabled** button. To disable IPSec Passthrough, click the **Disabled** button.
- PPPoE Passthrough. PPPoE Passthrough allows your PC(s) to use the PPPoE client software provided by your ISP. Some ISPs may request that you use this feature on the Router. To allow PPPoE Passthrough, click the **Enabled** button. To disable PPPoE Passthrough, click the **Disabled** button.
- PPTP Pass Through. Point-to-Point Tunneling Protocol Passthrough is the method used to enable VPN sessions to a Windows NT 4.0 or 2000 server. To allow PPTP Passthrough, click the **Enabled** button. To disable PPTP Passthrough, click the **Disabled** button.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Port Range Forwarding

When you click the Applications & Gaming tab, you will see the *Port Range Forwarding* screen (see Figure 7-18). Port Range Forwarding sets up public services on your network, such as web servers, ftp servers, e-mail servers, or other specialized Internet applications. (Specialized Internet applications are any applications that use Internet access to perform functions such as videoconferencing or online gaming. Some Internet applications may not require any forwarding.) When users send this type of request to your network via the Internet, the Router will forward those requests to the appropriate PC.

Before using Forwarding, you should assign a static IP address to the designated PC.

If you need to forward all ports to one PC, click the **DMZ** tab.

Figure 7-18: Port Range Forwarding

Port Range Forwarding

Port Range

To add a server using Port Range Forwarding, complete the following fields:

- Application. Enter the name of the application.
- Start and End. Enter the number or range of external port(s) used by the server or Internet application. Check with the Internet application software documentation for more information.
- Protocol. Select the protocol **TCP** or **UDP**, or select **Both**.
- IP Address. Enter the IP address of the server that you want the Internet users to be able to access. To find the IP address, go to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."
- Enabled. Check the **Enabled** box to enable the services you have defined. Port Range Forwarding will not function if the Enabled button is left unchecked. This is disabled (unchecked) by default.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Port Triggering

The *Port Triggering* screen, as shown in Figure 7-19, allows the Router to watch outgoing data for specific port numbers. The IP address of the computer that sends the matching data is remembered by the Router, so that when the requested data returns through the Router, the data is pulled back to the proper computer by way of IP address and port mapping rules.

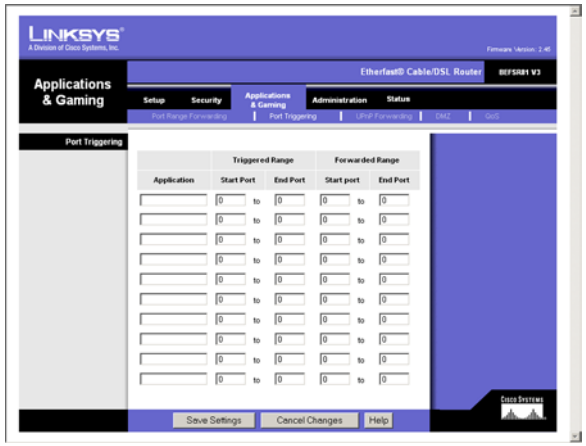

Figure 7-19: Port Triggering

Port Triggering

- Application. Enter the application name of the trigger.

Triggered Range

For each application, list the triggered port number range. Check with the Internet application documentation for the port number(s) needed.

- Start Port. Enter the starting port number of the Triggered Range.
- End Port. Enter the ending port number of the Triggered Range.

Forwarded Range

For each application, list the forwarded port number range. Check with the Internet application documentation for the port number(s) needed.

- Start Port. Enter the starting port number of the Forwarded Range.
- End Port. Enter the ending port number of the Forwarded Range.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

UPnP Forwarding

The *UPnP Forwarding* screen displays preset application settings as well as options to customize port services for other applications. See Figure 7-20.

Figure 7-20: UPnP Forwarding

UPnP Forwarding

- Application. Ten preset applications are preset. You can specify up to five additional applications in the available fields.

The preset applications are among the most widely used Internet applications. They include the following:

- FTP (File Transfer Protocol). A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a website on a local machine, they are typically uploaded to the web server using FTP.
- Telnet. A terminal emulation protocol commonly used on Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.
- SMTP (Simple Mail Transfer Protocol). The standard e-mail protocol on the Internet. It is a TCP/IP protocol that defines the message format and the message transfer agent (MTA), which stores and forwards the mail.
- DNS (Domain Name System). The way that Internet domain names are located and translated into IP addresses. A domain name is a meaningful and easy-to-remember “handle” for an Internet address.
- TFTP (Trivial File Transfer Protocol). A version of the TCP/IP FTP protocol that has no directory or password capability.
- Finger. A UNIX command widely used on the Internet to find out information about a particular user, such as a telephone number, whether the user is currently logged on, and the last time the user was logged on. The person being “fingered” must have placed his or her profile on the system in order for the information to be available. Fingering requires entering the full user@domain address.

- HTTP (HyperText Transport Protocol). The communications protocol used to connect to servers on the World Wide Web. Its primary function is to establish a connection with a web server and transmit HTML pages to the client web browser.
- POP3 (Post Office Protocol 3). A standard mail server commonly used on the Internet. It provides a message store that holds incoming e-mail until users log on and download it. POP3 is a simple system with little selectivity. All pending messages and attachments are downloaded at the same time. POP3 uses the SMTP messaging protocol.
- NNTP (Network News Transfer Protocol). The protocol used to connect to Usenet groups on the Internet. Usenet newsreaders support the NNTP protocol.
- SNMP (Simple Network Management Protocol). A widely used network monitoring and control protocol. Data is passed from SNMP agents, which are hardware and/or software processes reporting activity in each network device (hub, router, bridge, etc.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a data structure that defines what is obtainable from the device and what can be controlled (turned off, on, etc.).

- Ext. Port. Enter the number of the external port used by the server in the *Ext. Port* column. Check with the Internet application documentation for more information.
- TCP or UDP. Select the protocol **UDP** or **TCP** for each application. You cannot select both protocols.
- Int. Port. Enter the number of the internal port used by the server in the *Int. Port* column. Check with the Internet application software documentation for more information.
- IP Address. Enter the IP address of the server that you want the Internet users to be able to access. To find the IP address, go to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."
- Enabled. Check the **Enabled** box to enable the service you have defined. UPnP Forwarding will not function if the Enabled button is left unchecked. This is disabled (unchecked) by default.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

DMZ

The *DMZ* screen allows one local user to be exposed to the Internet for use of a special-purpose service such as Internet gaming and videoconferencing. Whereas Port Range Forwarding can only forward a maximum of 10 ranges of ports, DMZ hosting forwards all the ports for one PC at the same time.

DMZ

- DMZ. To use this feature, select **Enable**. To disable DMZ hosting, select **Disable** (see Figure 7-21).
- DMZ Host IP Address. To expose one PC, enter the computer's IP address. To get the IP address of a computer, refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter." Deactivate DMZ by entering a **0** in the field.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Figure 7-21: DMZ

QoS

Quality of Service (QoS) ensures better service to high-priority types of network traffic, which may involve demanding, real-time applications, such as videoconferencing. See Figure 7-22.

QoS

There are two types of QoS available, Application-based and Port-based.

- Enabled/Disabled. To use QoS, select **Enabled**. If you do not want to use QoS, keep the default, **Disabled**.

Application-based QoS

Application-based QoS manages information as it is transmitted and received. Depending on the settings of the *QoS* screen, this feature will assign information a high or low priority for the five preset applications and three additional applications that you specify. For each application, select **High priority** or **Low priority**. If you select **Disable**, then QoS will be disabled for that application.

- FTP (File Transfer Protocol). A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a website on a local machine, they are typically uploaded to the web server using FTP.
- HTTP (HyperText Transport Protocol). The communications protocol used to connect to servers on the World Wide Web. Its primary function is to establish a connection with a web server and transmit HTML pages to the client web browser.
- Telnet. A terminal emulation protocol commonly used on Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.

Figure 7-22: QoS

- SMTP (Simple Mail Transfer Protocol). The standard e-mail protocol on the Internet. It is a TCP/IP protocol that defines the message format and the message transfer agent (MTA), which stores and forwards the mail.
- POP3 (Post Office Protocol 3). A standard mail server commonly used on the Internet. It provides a message store that holds incoming e-mail until users log on and download it. POP3 is a simple system with little selectivity. All pending messages and attachments are downloaded at the same time. POP3 uses the SMTP messaging protocol.
- Specific Port#. You can add three additional applications by entering their respective port numbers in the *Specific Port#* fields.

Port-based QoS

Port-based QoS allows you to prioritize performance for four of the Router's ports, LAN Ports 1-4. For each of these ports, select **High priority** or **Low priority**. If you select **Disable**, then QoS will be disabled for that port. The Router's other four ports will be automatically assigned low priority.

Port-based QoS does not require support from your ISP because the prioritized ports are LAN ports going out to your network.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Management

When you click the Administration tab, you will see the *Management* screen (see Figure 7-23). This screen allows you to change the Router's access settings as well as configure the UPnP (Universal Plug and Play) features.

Router Access

Local Router Access

To ensure the Router's security, you will be asked for your password when you access the Router's Web-based Utility. The default password is **admin**.

- Router Password. It is recommended that you change the default password to one of your choice.
- Re-enter to confirm. Re-enter the Router's new Password to confirm it.

Figure 7-23: Management

Remote Router Access

This feature allows you to access the Router from a remote location, via the Internet.

- Remote Upgrade. Remote Upgrade allows you to upgrade the Router's firmware from a remote location. To enable this feature, click the **Enabled** radio button. Remote Administration must be activated before you can access the Router from a remote location.
- Remote Administration. This feature allows you to manage the Router from a remote location, via the Internet. To enabled Remote Administration, click the **Enabled** radio button.
- Administration Port. Enter the port number you will use to remotely access the Router.

Note: When you are in a remote location and wish to manage the Router, enter *http://<Internet IP Address>: port*. Enter the Router's specific Internet IP address in place of *<Internet IP Address>*, and enter the Administration Port number in place of the word *port*.

SNMP

The Router supports Simple Network Management Protocol (SNMP), which is a widely used network monitoring and control protocol. This allows network supervisors to monitor the Router using network management systems such as HP OpenView.

Note: You can use a standard Management Information Base (MIB) II file with the Router; no special MIB file is required or provided.

- Enabled/Disabled. To use SNMP, select **Enabled**. If you do not want to use SNMP, keep the default, **Disabled**.

Identification

- Contact. Enter the name of the contact person for the Router.
- Device Name. Enter the name of the Router.
- Location. Enter the location of the Router.
- Get Community. Enter the password that allows read-only access to the Router's SNMP information.
- Set Community. Enter the password that allows read/write access to the Router's SNMP information.

- SNMP Trusted Host. You can restrict access to the Router's SNMP information by IP address. Enter the IP address or range of IP addresses in the *SNMP Trusted Host* field. If this field is left blank, then access is permitted from any IP address.
- SNMP Trap-Community. Enter the password required by the remote host computer that will receive trap messages or notices sent by the Router.
- SNMP Trap-Destination. Enter the IP address of the remote host computer that will receive the trap messages.

UPnP

- UPnP. UPnP allows Windows XP to automatically configure the Router for various Internet applications, such as gaming and videoconferencing.
- Allow users to make configuration changes. When enabled, this feature allows you to make manual changes while still using the UPnP feature.
- Allow users to disable Internet access. When enabled, this feature allows you to prohibit any and all Internet connections.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Log

When you click the Administration tab, you will see the *Log* screen (see Figure 7-24). It provides you with a log of all incoming and outgoing URLs or IP addresses for your Internet connection.

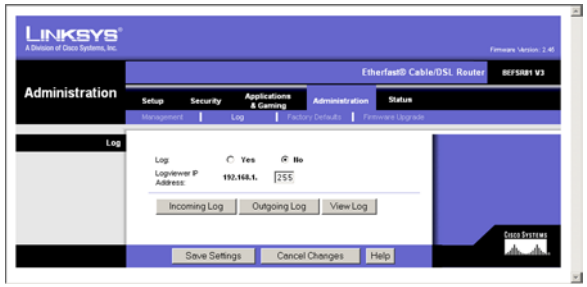

Figure 7-24: Log

Log

- Log. To access activity logs, select the **Yes** radio button. With logging enabled, you can choose to view temporary logs or keep a permanent record using the Logviewer software. Click the **No** button to disable this function.
- Logviewer IP Address. For a permanent record of these logs, Logviewer software must be used. This software is downloadable from the Linksys website, *www.linksys.com*. The Logviewer saves all incoming and outgoing activity in a permanent file on your PC's hard drive. In the *Logviewer IP Address* field, enter the fixed IP address of the PC running the Logviewer software. The Router will now send updated logs to that PC.

- Incoming Log. Click the **Incoming Log** button to view a temporary log of the Source IP addresses and Destination Port Numbers for all the incoming Internet traffic. Click the **Refresh** button to update the log. See Figure 7-25.
- Outgoing Log. Click the **Outgoing Log** button to view a temporary log of all the URLs and IP addresses of Internet sites that users on your network have accessed. The LAN IP address, Destination URL/IP, and Service/Port Number for each site are listed. Click the **Refresh** button to update the log. See Figure 7-26.
- View Log. Click the **View Logs** button to display a log of all activities and to access a drop-down menu of various logs to view (see Figure 7-27).

  From the drop-down menu, select the log you wish to view: **All**, **System Log**, or **Access Log**. When you select All, you will see a log of all activities, a combination of the System and Access Logs. The System Log displays a list of cold and warm starts, web login successes and failures, and packet filtering policies, while the Access Log shows all data traffic.

  - Clear. To clear a log, click the **Clear** button.
  - Refresh. To update a log, click the **Refresh** button.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Figure 7-25: Incoming Log Table

Figure 7-26: Outgoing Log Table

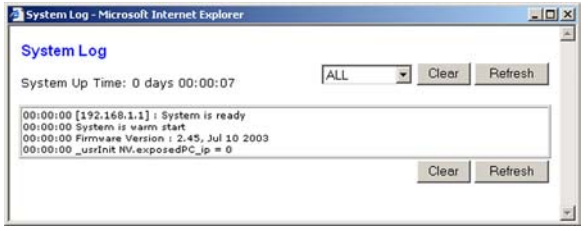

Figure 7-27: System Log

Factory Defaults

The *Factory Defaults* screen, shown in Figure 7-28, allows you to restore the Router's configuration to its factory default settings.

Figure 7-28: Factory Defaults

Factory Defaults

Note: Do not restore the factory defaults unless you are having difficulties with the Router and have exhausted all other troubleshooting measures. Once the Router is reset, you will have to re-enter all of your configuration settings.

- Restore Factory Defaults. To clear all of the Router's settings and reset them to its factory defaults, click the **Yes** radio button.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. For further help on this tab, click the **Help** button.

Firmware Upgrade

The *Firmware Upgrade* screen allows you to upgrade the Router's firmware.

Note: If you upgrade the Router's firmware, you may lose its configuration settings.

Before upgrading the firmware, download the Router's firmware upgrade file from the Linksys website, *www.linksys.com*. Then extract the file.

Figure 7-29: Firmware Upgrade

Upgrade Firmware

- Please select a file to upgrade. In the field provided, enter the name of the extracted firmware upgrade file, or click the **Browse** button to find this file.
- Upgrade. After you have selected the appropriate file, click the **Upgrade** button, and follow the on-screen instructions.

For further help on this tab, click the **Help** button.

Router

When you click the Status tab, you will see the *Router* screen (see Figure 7-30). It displays information about the Router and its settings.

Note: The information provided and buttons available may vary depending on the Router's settings.

Figure 7-30: Router

Information

- Firmware Version. This shows the installed version and date of the firmware.
- MAC Address. The MAC Address of the Router's Internet interface is displayed here.

Status

- Login Type. This indicates the type of Internet connection you are using.

- Login Status. The status of the connection is displayed only for PPPoE, RAS, PPTP, or Heart Beat Signal connections. For these dial-up style connections, there is a Connect button to click if there is no connection and you want to establish an Internet connection.
- Internet IP Address. The Router's Internet IP Address is displayed here.
- Subnet Mask and Default Gateway. The Router's Subnet Mask and Default Gateway address are displayed here for DHCP and static IP connections.
- Primary DNS and Secondary DNS. Shown here are the DNS (Domain Name System) IP addresses currently used by the Router.
- DHCP Release. Available for a DHCP connection, click the **DHCP Release** button to release the current IP address of the device connected to the Router's Internet port.
- DHCP Renew. Available for a DHCP connection, click the **DHCP Renew** button to replace the current IP address—of the device connected to the Router's Internet port—with a new IP address.

Click the **Refresh** button to update the on-screen information. For further help on this tab, click the **Help** button.

Local Network

The *Local Network* screen displays information about the local network. See Figure 7-31.

Local Network

- Local MAC Address. The MAC Address of the Router's LAN (local area network) interface is displayed here.
- IP Address. The Router's local IP Address is shown here.
- Subnet Mask. The Router's Subnet Mask is shown here.
- DHCP Server. The status of the DHCP server is displayed here.
- DHCP Client Table. Click the **DHCP Clients Table** button to view a list of PCs that have been assigned IP addresses by the Router. The *DHCP Active IP Table* screen, shown in Figure 7-32, lists the DHCP Server IP Address, Client Hostnames, IP Addresses, and MAC Addresses. Click the **Refresh** button to update the information.

Click the **Refresh** button to update the on-screen information. For further help on this tab, click the **Help** button.

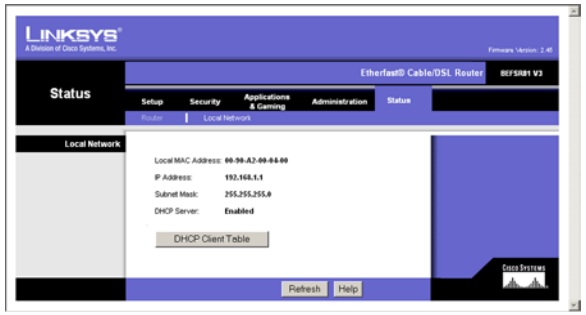

Figure 7-31: Local Network

Figure 7-32: DHCP Active IP Table

Appendix A: Troubleshooting

This appendix provides solutions to problems that may occur during the installation and operation of the Router. Read the description below to solve your problems. If you can't find an answer here, check the Linksys website at *www.linksys.com*.

Common Problems and Solutions

1. ***I need to set a static IP address on a PC.***
   The Router, by default, assigns an IP address range of 192.168.1.100 to 192.168.1.150 using the DHCP server on the Router. To set a static IP address, you can only use the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254. Each PC or network device that uses TCP/IP must have a unique address to identify itself in a network. If the IP address is not unique to a network, Windows will generate an IP conflict error message. You can assign a static IP address to a PC by performing the following steps:

   For Windows 98 and Millennium:

   A. Click **Start**, **Setting**, and **Control Panel**. Double-click **Network**.
   B. In *The following network components are installed* box, select the **TCP/IP**-> associated with your Ethernet adapter. If you only have one Ethernet adapter installed, you will only see one TCP/IP line with no association to an Ethernet adapter. Highlight it and click the **Properties** button.
   C. In the *TCP/IP properties* window, select the **IP address** tab, and select **Specify an IP address**. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254. Make sure that each IP address is unique for each PC or network device.
   D. Click the **Gateway** tab, and in the *New Gateway* prompt, enter **192.168.1.1**, which is the default IP address of the Router. Click the **Add** button to accept the entry.
   E. Click the **DNS** tab, and make sure the **DNS Enabled** option is selected. Enter the Host and Domain names (e.g., John for Host and home for Domain). Enter the DNS entry provided by your ISP. If your ISP has not provided the DNS IP address, contact your ISP to get that information or go to its website for the information.
   F. Click the **OK** button in the *TCP/IP properties* window, and click **Close** or the **OK** button for the *Network* window.
   G. Restart the computer when asked.

   For Windows 2000:

   A. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network and Dial-Up Connections**.

B. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
C. In the *Components checked are used by this connection* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Select **Use the following IP address** option.
D. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254.
E. Enter the Subnet Mask, **255.255.255.0**.
F. Enter the Default Gateway, **192.168.1.1** (Router's default IP address).
G. Toward the bottom of the window, select **Use the following DNS server addresses**, and enter the Preferred DNS server and Alternative DNS server (provided by your ISP). Contact your ISP or go on its website to find the information.
H. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
I. Restart the computer if asked.

For Windows XP:

The following instructions assume you are running Windows XP with the default interface. If you are using the Classic interface (where the icons and menus look like previous Windows versions), please follow the instructions for Windows 2000.

A. Click **Start** and **Control Panel**.
B. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
C. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
D. In the *This connection uses the following items* box, highlight **Internet Protocol (TCP/IP)**. Click the **Properties** button.
E. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254.
F. Enter the Subnet Mask, **255.255.255.0**.
G. Enter the Default Gateway, **192.168.1.1** (Router's default IP address).
H. Toward the bottom of the window, select **Use the following DNS server addresses**, and enter the Preferred DNS server and Alternative DNS server (provided by your ISP). Contact your ISP or go on its website to find the information.
I. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window. Click the **OK** button in the *Local Area Connection Properties* window.

2. I want to test my Internet connection.

A. Check your TCP/IP settings.

For Windows 98 and Millennium:

Refer to Windows Help and "Chapter 5: Configuring the PCs" for details. Make sure **Obtain IP address automatically** is selected in the settings.

For Windows 2000:

1. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network and Dial-Up Connections**.
2. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
3. In the *Components checked are used by this connection* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Make sure that **Obtain an IP address automatically** and **Obtain DNS server address automatically** are selected.
4. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
5. Restart the computer if asked.
6. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
7. Restart the computer if asked.

For Windows XP:

The following instructions assume you are running Windows XP with the default interface. If you are using the Classic interface (where the icons and menus look like previous Windows versions), please follow the instructions for Windows 2000.

1. Click **Start** and **Control Panel**.
2. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
3. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
4. In the *This connection uses the following items* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Make sure that **Obtain an IP address automatically** and **Obtain DNS server address automatically** are selected.

B. Open a command prompt.

- For Windows 98 and Millennium, click **Start** and **Run**. In the *Open* field, type **command**. Press the **Enter** key or click the **OK** button.
- For Windows 2000 and XP, click **Start** and **Run**. In the *Open* field, type **cmd**. Press the **Enter** key or click the **OK** button.

C. In the command prompt, type **ping 192.168.1.1** and press the **Enter** key.
- If you get a reply, the computer is communicating with the Router.
- If you do NOT get a reply, check the cable, and make sure **Obtain an IP address automatically** is selected in the TCP/IP settings for your Ethernet adapter.

D. In the command prompt, type **ping** followed by your Internet IP address and press the **Enter** key. The Internet IP Address can be found in the web interface of the Router. For example, if your Internet IP address is 1.2.3.4, you would enter **ping 1.2.3.4** and press the **Enter** key.
- If you get a reply, the computer is connected to the Router.
- If you do NOT get a reply, try the ping command from a different computer to verify that your original computer is not the cause of the problem.

E. In the command prompt, type **ping www.linksys.com** and press the **Enter** key.
- If you get a reply, the computer is connected to the Internet. If you cannot open a webpage, try the ping command from a different computer to verify that your original computer is not the cause of the problem.
- If you do NOT get a reply, there may be a problem with the connection. Try the ping command from a different computer to verify that your original computer is not the cause of the problem.

3. I am not getting an IP address on the Internet with my Internet connection.

A. Refer to "Problem #2, I want to test my Internet connection" to verify that you have connectivity.
B. If you need to register the MAC address of your Ethernet adapter with your ISP, please see "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter." If you need to clone the MAC address of your Ethernet adapter onto the Router, see the MAC Address Clone section of "Chapter 7: Using the Router's Web-based Utility" for details.
C. Make sure you are using the right Internet settings. Contact your ISP to see if your Internet connection type is DHCP, Static IP Address, or PPPoE (commonly used by DSL consumers). Please refer to the Basic Setup section of "Chapter 7: Using the Router's Web-based Utility" for details on Internet Connection Type settings.
D. Make sure you use the right cable. Check to see if the Internet LED is solidly lit.
E. Make sure the cable connecting from your cable or DSL modem is connected to the Router's Internet port. Verify that the Status page of the Router's Web-based Utility shows a valid IP address from your ISP.
F. Turn off the computer, Router, and cable/DSL modem. Wait 30 seconds, and then turn on the Router, cable/DSL modem, and computer. Check the Status tab of the Router's Web-based Utility to see if you get an IP address.

4. I am not able to access the Router's Web-based Utility Setup page.

A. Refer to "Problem #2, I want to test my Internet connection" to verify that your computer is properly connected to the Router.
B. Refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" to verify that your computer has an IP Address, Subnet Mask, Gateway, and DNS.
C. Set a static IP address on your system; refer to "Problem #1: I need to set a static IP address."
D. Refer to "Problem #10: I need to remove the proxy settings or the dial-up pop-up window (for PPPoE users)."

5. I can't get my Virtual Private Network (VPN) to work through the Router.

Access the Router's web interface by going to **http://192.168.1.1** or the IP address of the Router, and go to the **Security** => **VPN Passthrough** tab. Make sure you have IPsec passthrough and/or PPTP passthrough enabled.

VPNs that use IPSec with the ESP (Encapsulation Security Payload known as protocol 50) authentication will work fine. At least one IPSec session will work through the Router; however, simultaneous IPSec sessions may be possible, depending on the specifics of your VPNs.

VPNs that use IPSec and AH (Authentication Header known as protocol 51) are incompatible with the Router. AH has limitations due to occasional incompatibility with the NAT standard.

Change the IP address for the Router to another subnet to avoid a conflict between the VPN IP address and your local IP address. For example, if your VPN server assigns an IP address 192.168.1.X (X is a number from 1 to 254) and your local LAN IP address is 192.168.1.X (X is the same number used in the VPN IP address), the Router will have difficulties routing information to the right location. If you change the Router's IP address to 192.168.2.1, that should solve the problem. Change the Router's IP address through the Basic Setup tab of the Web-based Utility. If you assigned a static IP address to any computer or network device on the network, you need to change its IP address accordingly to 192.168.2.Y (Y being any number from 1 to 254). Note that each IP address must be unique within the network.

Your VPN may require port 500/UDP packets to be passed to the computer that is connecting to the IPSec server. Refer to "Problem #7, I need to set up online game hosting or use other Internet applications" for details.

Check the Linksys website at *www.linksys.com* for more information.

6. I need to set up a server behind my Router.

To use a server like a web, ftp, or mail server, you need to know the respective port numbers they are using. For example, port 80 (HTTP) is used for web; port 21 (FTP) is used for FTP, and port 25 (SMTP outgoing) and port 110 (POP3 incoming) are used for the mail server. You can get more information by viewing the

documentation provided with the server you installed. Follow these steps to set up port forwarding through the Router's Web-based Utility. We will be setting up web, ftp, and mail servers.

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Applications & Gaming** => **Port Range Forwarding** tab.
B. Enter any name you want to use for the Application.
C. Enter the port range of the service you are using. For example, if you have a web server, you would enter the range 80 to 80.
D. Select the protocol you will be using, **TCP** or **UDP**, or select **Both**.
E. Enter the IP address of the PC or network device that you want the port server to go to. For example, if the web server's Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.
F. Check the **Enabled** option for the port services you want to use. Consider the example below:

Application	Start and End	Protocol	IP Address	Enabled
Web server	80 to 80	Both	192.168.1.100	X
FTP server	21 to 21	TCP	192.168.1.101	X
SMTP (outgoing)	25 to 25	Both	192.168.1.102	X
POP3 (incoming)	110 to 110	Both	192.168.1.102	X

When you have completed the configuration, click the **Save Settings** button.

7. I need to set up online game hosting or use other Internet applications.

If you want to play online games or use Internet applications, most will work without doing any port forwarding or DMZ hosting. There may be cases when you want to host an online game or Internet application. This would require you to set up the Router to deliver incoming packets or data to a specific computer. This also applies to the Internet applications you are using. The best way to get the information on what port services to use is to go to the website of the online game or application you want to use. Follow these steps to set up online game hosting or use a certain Internet application:

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Applications & Gaming** => **Port Range Forwarding** tab.
B. Enter any name you want to use for the Application.
C. Enter the port range of the service you are using. For example, if you have a web server, you would enter the range 80 to 80.

D. Select the protocol you will be using, **TCP** or **UDP**, or select **Both**.
E. Enter the IP address of the PC or network device that you want the port server to go to. For example, if the web server's Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.
F. Check the **Enabled** option for the port services you want to use. Consider the example below:

Application	Start and End	Protocol	IP Address	Enabled
UT	7777 to 27900	Both	192.168.1.100	X
Halflife	27015 to 27015	Both	192.168.1.105	X
PC Anywhere	5631 to 5631	UDP	192.168.1.102	X
VPN IPSEC	500 to 500	UDP	192.168.1.100	X

When you have completed the configuration, click the **Save Settings** button.

8. I can't get the Internet game, server, or application to work.

If you are having difficulties getting any Internet game, server, or application to function properly, consider exposing one PC to the Internet using DeMilitarized Zone (DMZ) hosting. This option is available when an application requires too many ports or when you are not sure which port services to use. Make sure you disable all the forwarding entries if you want to successfully use DMZ hosting, since forwarding has priority over DMZ hosting. (In other words, data that enters the Router will be checked first by the forwarding settings. If the port number that the data enters from does not have port forwarding, then the Router will send the data to whichever PC or network device you set for DMZ hosting.) Follow these steps to set DMZ hosting:

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Applications & Gaming** => **Port Range Forwarding** tab.
B. Disable or remove the entries you have entered for forwarding. Keep this information in case you want to use it at a later time.
C. Click the **DMZ** tab.
D. Enter the Ethernet adapter's IP address of the computer you want exposed to the Internet. This will bypass the NAT security for that computer. Please refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.

Once completed with the configuration, click the **Save Settings** button.

9. I forgot my password, or the password prompt always appears when saving settings to the Router.

Reset the Router to factory default by pressing the Reset button for 30 seconds and then releasing it. If you are still getting prompted for a password when saving settings, then perform the following steps:

A. Access the Router's web interface by going to **http://192.168.1.1** or the IP address of the Router. Enter the default password admin, and click the **Administration** => **Management** tab.
B. Enter a different password in the *Router Password* field, and enter the same password in the second field to confirm the password.
C. Click the **Save Settings** button.

10. I am a PPPoE user, and I need to remove the proxy settings or the dial-up pop-up window.

If you have proxy settings, you need to disable these on your computer. Because the Router is the gateway for the Internet connection, the computer does not need any proxy settings to gain access. Please follow these directions to verify that you do not have any proxy settings and that the browser you use is set to connect directly to the LAN.

For Microsoft Internet Explorer 5.0 or higher:

A. Click **Start**, **Settings**, and **Control Panel**. Double-click **Internet Options**.
B. Click the **Connections** tab.
C. Click the **LAN settings** button and remove anything that is checked.
D. Click the **OK** button to go back to the previous screen.
E. Click the option **Never dial a connection**. This will remove any dial-up pop-ups for PPPoE users.

For Netscape 4.7 or higher:

A. Start **Netscape Navigator**, and click **Edit**, **Preferences**, **Advanced**, and **Proxies**.
B. Make sure you have **Direct connection to the Internet** selected on this screen.
C. Close all the windows to finish.

11. To start over, I need to set the Router to factory default.

Hold the Reset button for up to 30 seconds and then release it. This will return the password, forwarding, and other settings on the Router to the factory default settings. In other words, the Router will revert to its original factory configuration.

12. I need to upgrade the firmware.

In order to upgrade the firmware with the latest features, you need to go to the Linksys website and download the latest firmware at *www.linksys.com*. Follow these steps:

A. Go to the Linksys website at **http://www.linksys.com** and download the latest firmware.

B. To upgrade the firmware, follow the steps in the Upgrade section found in "Chapter 7: Using the Router's Web-based Utility" or "Appendix B: Upgrading Firmware."

13. The firmware upgrade failed.

The upgrade could have failed for a number of reasons. Follow these steps to upgrade the firmware:

A. If the firmware upgrade failed, use the TFTP program (it was downloaded along with the firmware). Open the pdf that was downloaded along with the firmware and TFTP program, and follow the pdf's instructions.
B. Set a static IP address on the PC; refer to "Problem #1, I need to set a static IP address." Use the following IP address settings for the computer you are using:

   IP Address: 192.168.1.50
   Subnet Mask: 255.255.255.0
   Gateway: 192.168.1.1

C. Perform the upgrade using the TFTP program or the Router's Web-based Utility through its Administration => Firmware Upgrade tab.

14. My DSL service's PPPoE is always disconnecting.

PPPoE is not actually a dedicated or always-on connection. The DSL ISP can disconnect the service after a period of inactivity, just like a normal phone dial-up connection to the Internet. There is a setup option to "keep alive" the connection. This may not always work, so you may need to re-establish connection periodically.

A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
B. Enter the password, if asked. (The default password is admin.)
C. On the *Basic Setup* tab, select the option **Keep Alive**, and set the *Redial Period* option at **20** (seconds).
D. Click the **Save Settings** button.
E. Click the **Status** tab, and click the **Connect** button.
F. You may see the login status display as Connecting. Press the **F5** key to refresh the screen, until you see the login status display as Connected.

If the connection is lost again, follow steps E and F to re-establish connection.

15. I can't access my email, web, or VPN, or I am getting corrupted data from the Internet.

The Maximum Transmission Unit (MTU) setting may need to be adjusted. By default, the MTU is set at 1500. For most DSL users, it is strongly recommended to use MTU 1492. If you are having some difficulties, perform the following steps:

A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
B. Enter the password, if asked. (The default password is **admin**.)
C. On the *Basic Setup* tab, look for the MTU option, and select **Enable**. In the *Size* field, enter 1492.
D. Click the **Save Settings** button to continue.

If your difficulties continue, change the Size to different values. Try this list of values, one value at a time, in this order, until your problem is solved:
1462
1400
1362
1300

16. I need to use port triggering.

Port triggering looks at the outgoing port services used and will trigger the Router to open a specific port, depending on which port an Internet application uses. Follow these steps:

A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
B. Enter the password, if asked. (The default password is **admin**.)
C. Click the **Applications & Gaming** => **Port Triggering** tab.
D. Enter any name you want to use for the Application Name.
E. Enter the Start and End Ports of the Triggered Port Range. Check with your Internet application provider for more information on which outgoing port services it is using.
F. Enter the Start and End Ports of the Forwarded Port Range. Check with your Internet application provider for more information on which incoming port services are required by the Internet application.

17. When I enter a URL or IP address, I get a time-out error or am prompted to retry.

- Check if other PCs work. If they do, ensure that your workstation's IP settings are correct (IP Address, Subnet Mask, Default Gateway, and DNS). Restart the computer that is having a problem.
- If the PCs are configured correctly, but still not working, check the Router. Ensure that it is connected and powered on. Connect to it and check its settings. (If you cannot connect to it, check the LAN and power connections.)
- If the Router is configured correctly, check your Internet connection (DSL/cable modem, etc.) to see if it is working correctly. You can remove the Router to verify a direct connection.
- Manually configure the TCP/IP with a DNS address provided by your ISP.
- Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools**, **Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is

set to **Never dial a connection**. For Netscape Navigator, click **Edit**, **Preferences**, **Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

Frequently Asked Questions

What is the maximum number of IP addresses that the Router will support?
The Router will support up to 253 IP addresses.

Is IPSec Passthrough supported by the Router?
Yes, enable or disable IPSec Passthrough on the Security => VPN Passthrough tab.

Where is the Router installed on the network?
In a typical environment, the Router is installed between the cable/DSL modem and the LAN. Plug the Router into the cable/DSL modem's Ethernet port.

Does the Router support IPX or AppleTalk?
No. TCP/IP is the only protocol standard for the Internet and has become the global standard for communications. IPX, a NetWare communications protocol used only to route messages from one node to another, and AppleTalk, a communications protocol used on Apple and Macintosh networks, can be used for LAN to LAN connections, but those protocols cannot connect from the Internet to the LAN.

What is Network Address Translation and what is it used for?
Network Address Translation (NAT) translates multiple IP addresses on the private LAN to one public address that is sent out to the Internet. This adds a level of security since the address of a PC connected to the private LAN is never transmitted on the Internet. Furthermore, NAT allows the Router to be used with low cost Internet accounts, such as DSL or cable modems, when only one TCP/IP address is provided by the ISP. The user may have many private addresses behind this single address provided by the ISP.

Does the Router support any operating system other than Windows 98, Millennium, 2000, or XP?
Yes, but Linksys does not, at this time, provide technical support for setup, configuration or troubleshooting of any non-Windows operating systems.

Does the Router support ICQ send file?
Yes, with the following fix: click **ICQ menu** => **preference** => **connections** tab=>, and check **I am behind a firewall or proxy**. Then set the firewall time-out to 80 seconds in the firewall setting. The Internet user can then send a file to a user behind the Router.

I set up an Unreal Tournament Server, but others on the LAN cannot join. What do I need to do?
If you have a dedicated Unreal Tournament server running, you need to create a static IP for each of the LAN computers and forward ports 7777, 7778, 7779, 7780, 7781, and 27900 to the IP address of the server. You can also use a port forwarding range of 7777 to 27900. If you want to use the UT Server Admin, forward another port (8080 usually works well but is used for remote admin. You may have to disable this.), and then in the [UWeb.WebServer] section of the server.ini file, set the ListenPort to 8080 (to match the mapped port above) and ServerName to the IP assigned to the Router from your ISP.

Can multiple gamers on the LAN get on one game server and play simultaneously with just one public IP address?
It depends on which network game or what kind of game server you are using. For example, Unreal Tournament supports multi-login with one public IP.

How do I get* Half-Life: Team Fortress *to work with the Router?
The default client port for Half-Life is 27005. The computers on your LAN need to have "+clientport 2700x" added to the HL shortcut command line; the x would be 6, 7, 8, and on up. This lets multiple computers connect to the same server. One problem: Version 1.0.1.6 won't let multiple computers with the same CD key connect at the same time, even if on the same LAN (not a problem with 1.0.1.3). As far as hosting games, the HL server does not need to be in the DMZ. Just forward port 27015 to the local IP address of the server computer.

How can I block corrupted FTP downloads?
If you are experiencing corrupted files when you download a file with your FTP client, try using another FTP program.

The web page hangs; downloads are corrupt, or nothing but junk characters are being displayed on the screen. What do I need to do?
Force your Ethernet adapter to 10Mbps or half duplex mode, and turn off the "Auto-negotiate" feature of your Ethernet adapter as a temporary measure. (Please look at the Network Control Panel in your Ethernet adapter's Advanced Properties tab.) Make sure that your proxy setting is disabled in the browser. Check our website at *www.linksys.com* for more information.

If all else fails in the installation, what can I do?
Reset the Router by holding down the Reset button for thirty seconds. Reset your cable or DSL modem by powering the unit off and then on. Obtain and flash the latest firmware release that is readily available on the Linksys website, *www.linksys.com*.

How can I be notified of new Router firmware upgrades?
All Linksys firmware upgrades are posted on the Linksys website at *www.linksys.com*, where they can be downloaded for free. The Router's firmware can be upgraded with TFTP programs. If the Router's Internet connection is working well, there is no need to download a newer firmware version, unless that version contains

new features that you would like to use. Downloading a more current version of Router firmware will not enhance the quality or speed of your Internet connection, and may disrupt your current connection stability.

Will the Router function in a Macintosh environment?
Yes, but the Router's setup pages are accessible only through Internet Explorer 5.0 or Netscape Navigator 5.0 or higher for Macintosh.

I am not able to get the web configuration screen for the Router. What can I do?
You may have to remove the proxy settings on your Internet browser, e.g., Netscape Navigator or Internet Explorer. Or remove the dial-up settings on your browser. Check with your browser documentation, and make sure that your browser is set to connect directly and that any dial-up is disabled. Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools**, **Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit**, **Preferences**, **Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

What is DMZ Hosting?
Demilitarized Zone (DMZ) allows one IP address (computer) to be exposed to the Internet. Some applications require multiple TCP/IP ports to be open. It is recommended that you set your computer with a static IP if you want to use DMZ Hosting. To get the LAN IP address, see "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."

If DMZ Hosting is used, does the exposed user share the public IP with the Router?
No.

Does the Router pass PPTP packets or actively route PPTP sessions?
The Router allows PPTP packets to pass through.

Is the Router cross-platform compatible?
Any platform that supports Ethernet and TCP/IP is compatible with the Router.

How many ports can be simultaneously forwarded?
Theoretically, the Router can establish 520 sessions at the same time, but you can only forward 10 ranges of ports.

Does the Router replace a modem? Is there a cable or DSL modem in the Router?
No, this version of the Router must work in conjunction with a cable or DSL modem.

Which modems are compatible with the Router?
The Router is compatible with virtually any cable or DSL modem that supports Ethernet.

What is the maximum number of VPN sessions allowed by the Router?
The maximum number depends on many factors. At least one IPSec session will work through the Router; however, simultaneous IPSec sessions may be possible, depending on the specifics of your VPNs.

How can I check whether I have static or DHCP IP addresses?
Ask your ISP to find out.

How do I get mIRC to work with the Router?
Under the Applications & Gaming => Port Range Forwarding tab, set port forwarding to **113** for the PC on which you are using mIRC.

If your questions are not addressed here, refer to the Linksys website, *www.linksys.com*.

Appendix B: Upgrading Firmware

You can use the Router's Web-based Utility to upgrade the firmware; however, if you do so, you may lose the settings you have configured on the Router.

To upgrade the Router's firmware, follow these instructions:

1. Download the Router's firmware upgrade file from the Linksys website, *www.linksys.com*.
2. Extract the file on your computer.
3. Click the **Administration** tab and then the **Firmware Upgrade** tab of the Router's Web-based Utility.
4. On the *Upgrade Firmware* screen, shown in Figure B-1, enter the location of the extracted firmware upgrade file, or click the **Browse** button to find this file.
5. Click the **Upgrade** button, and follow the on-screen instructions.

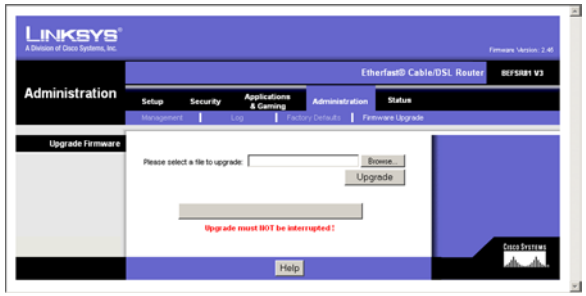

Figure B-1: Upgrade Firmware

Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter

This section describes how to find the MAC address for your computer's Ethernet adapter so you can use the MAC filtering and/or MAC address cloning feature of the Router. You can also find the IP address of your computer's Ethernet adapter. This IP address is used for the Router's filtering, forwarding, and/or DMZ features. Follow the steps in this appendix to find the adapter's MAC or IP address in Windows 98, Me, 2000, or XP.

Windows 98 or Me Instructions

1. Click **Start** and **Run**. In the *Open* field, enter **winipcfg**. Then press the **Enter** key or the **OK** button.
2. When the *IP Configuration* screen appears, select the Ethernet adapter you have connected to the Router via a CAT 5 Ethernet network cable. See Figure C-1.
3. Write down the Adapter Address as shown on your computer screen (see Figure C-2). This is the MAC address for your Ethernet adapter and is shown as a series of numbers and letters.

   The MAC address/Adapter Address is what you will use for MAC address cloning or MAC filtering.

   The example in Figure C-2 shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.

Note: The MAC address is also called the Adapter Address.

Figure C-1: IP Configuration Screen

Figure C-2: MAC Address/Adapter Address

Windows 2000 or XP Instructions

1. Click **Start** and **Run**. In the *Open* field, enter **cmd**. Press the **Enter** key or click the **OK** button.
2. At the command prompt, enter **ipconfig /all**. Then press the **Enter** key.

3. Write down the Physical Address as shown on your computer screen (Figure C-3); it is the MAC address for your Ethernet adapter. This appears as a series of numbers and letters.

   The MAC address/Physical Address is what you will use for MAC address cloning or MAC filtering.

Note: The MAC address is also called the Physical Address.

   The example in Figure C-3 shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.

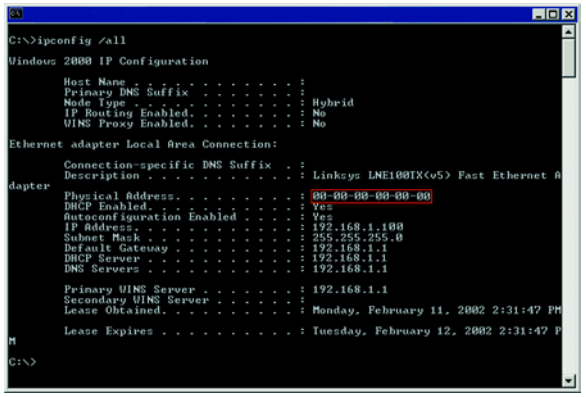
C:\>ipconfig /all
Windows 2000 IP Configuration
Host Name . . . . . :
Primary DNS Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Description . . . . . : Linksys LNE100TX(v5) Fast Ethernet A
dapter
Physical Address. . . . . : 00-00-00-00-00-00
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IP Address. . . . . : 192.168.1.100
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DHCP Server . . . . . : 192.168.1.1
DNS Servers . . . . . : 192.168.1.1
Primary WINS Server . . . . . : 192.168.1.1
Secondary WINS Server . . . . . :
Lease Obtained. . . . . : Monday, February 11, 2002 2:31:47 PM
Lease Expires . . . . . : Tuesday, February 12, 2002 2:31:47 P
M
C:\>

Figure C-3: MAC Address/Physical Address

For the Router's Web-based Utility

For MAC filtering, enter the 12-digit MAC address in this format, XXXXXXXXXXXX, WITHOUT the hyphens. See Figure C-4.

For MAC address cloning, enter the 12-digit MAC address in the *MAC Address* fields provided, two digits per field. See Figure C-5.

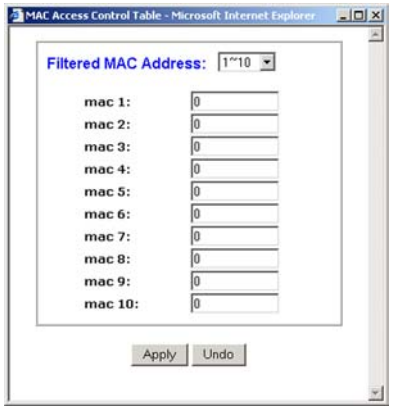

Figure C-4: MAC Address Filter

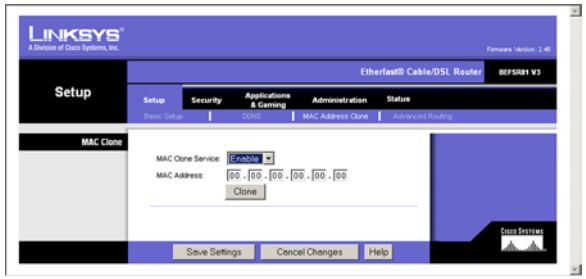

Figure C-5: MAC Address Clone

Appendix D: Windows Help

All networking products require Microsoft Windows. Windows is the most used operating system in the world and comes with many features that help make networking easier. These features can be accessed through Windows Help and are described in this appendix.

TCP/IP

Before a computer can communicate with the Router, TCP/IP must be enabled. TCP/IP is a set of instructions, or protocol, all PCs follow to communicate over a wired or wireless network. Your PCs will not be able to utilize networking without having TCP/IP enabled. Windows Help provides complete instructions on enabling TCP/IP.

Shared Resources

If you wish to share printers, folders, or files over your network, Windows Help provides complete instructions on utilizing shared resources.

Network Neighborhood/My Network Places

Other PCs on your network will appear under Network Neighborhood or My Network Places (depending upon the version of Windows you're running). Windows Help provides complete instructions on adding PCs to your network.

Appendix E: Glossary

802.11a - An IEEE wireless networking standard that specifies a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz.

802.11b - An IEEE wireless networking standard that specifies a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.

802.11g - An IEEE wireless networking standard that specifies a maximum data transfer rate of 54Mbps, an operating frequency of 2.4GHz, and backward compatibility with 802.11b devices.

Access Point - Device that allows wireless-equipped computers and other devices to communicate with a wired network. Also used to expand the range of a wireless network.

Adapter - This is a device that adds network functionality to your PC.

Ad-hoc - A group of wireless devices communicating directly with each other (peer-to-peer) without the use of an access point.

Backbone - The part of a network that connects most of the systems and networks together, and handles the most data.

Bandwidth - The transmission capacity of a given device or network.

Beacon Interval - The frequency interval of the beacon, which is a packet broadcast by a router to synchronize a wireless network.

Bit - A binary digit.

Boot - To start a device and cause it to start executing instructions.

Bridge - A device that connects two different kinds of local networks, such as a wireless network to a wired Ethernet network.

Broadband - An always-on, fast Internet connection.

Browser - A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web.

Buffer - A block of memory that temporarily holds data to be worked on later when a device is currently too busy to accept the data.

Cable Modem - A device that connects a computer to the cable television network, which in turn connects to the Internet.

CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance) - A method of data transfer that is used to prevent data loss in a network.

CTS (Clear To Send) - A signal sent by a device to indicate that it is ready to receive data.

Daisy Chain - A method used to connect devices in a series, one after the other.

Database - A collection of data that is organized so that its contents can easily be accessed, managed, and updated.

DDNS (Dynamic Domain Name System) - The capability of having a website, FTP, or e-mail server-with a dynamic IP address-use a fixed domain name.

Default Gateway - A device that forwards Internet traffic from your local area network.

DHCP (Dynamic Host Configuration Protocol) - A protocol that lets one device on a local network, known as a DHCP server, assign temporary IP addresses to the other network devices, typically computers.

DMZ (Demilitarized Zone) - Removes the Router's firewall protection from one PC, allowing it to be “seen” from the Internet.

DNS (Domain Name Server) - The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain - A specific name for a network of computers.

Download - To receive a file transmitted over a network.

DSL (Digital Subscriber Line) - An always-on broadband connection over traditional phone lines.

DSSS (Direct-Sequence Spread-Spectrum) - A type of radio transmission technology that includes a redundant bit pattern to lessen the probability of data lost during transmission. Used in 802.11b networking.

DTIM (Delivery Traffic Indication Message) - A message included in data packets that can increase wireless efficiency.

Dynamic IP Address - A temporary IP address assigned by a DHCP server.

Encryption - Encoding data to prevent it from being read by unauthorized people.

Ethernet - An IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium.

Finger - A program that tells you the name associated with an e-mail address.

Firewall - Security measures that protect the resources of a local network from intruders.

Firmware - 1. In network devices, the programming that runs the device. 2. Programming loaded into read-only memory (ROM) or programmable read-only memory (PROM) that cannot be altered by end-users.

Fragmentation - Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

FTP (File Transfer Protocol) - A standard protocol for sending files between computers over a TCP/IP network and the Internet.

Full Duplex - The ability of a networking device to receive and transmit data simultaneously.

Gateway - A system that interconnects networks.

Half Duplex - Data transmission that can occur in two directions over a single line, but only one direction at a time.

Hardware - The physical aspect of computers, telecommunications, and other information technology devices.

HTTP (HyperText Transport Protocol) - The communications protocol used to connect to servers on the World Wide Web.

IEEE (The Institute of Electrical and Electronics Engineers) - An independent institute that develops networking standards.

Infrastructure - Currently installed computing and networking equipment.

Infrastructure Mode - Configuration in which a wireless network is bridged to a wired network via an access point.

IP (Internet Protocol) - A protocol used to send data over a network.

IP Address - The address used to identify a computer or device on a network.

IPCONFIG - A Windows 2000 and XP utility that displays the IP address for a particular networking device.

IPSec (Internet Protocol Security) - A VPN protocol used to implement secure exchange of packets at the IP layer.

ISM band - Radio band used in wireless networking transmissions.

ISP (Internet Service Provider) - A company that provides access to the Internet.

LAN (Local Area Network) - The computers and networking products that make up the network in your home or office.

MAC (Media Access Control) Address - The unique address that a manufacturer assigns to each networking device.

Mbps (Megabits Per Second) - One million bits per second; a unit of measurement for data transmission.

Multicasting - Sending data to a group of destinations at once.

NAT (Network Address Translation) - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

Network - A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

NNTP (Network News Transfer Protocol) - The protocol used to connect to Usenet groups on the Internet.

Node - A network junction or connection point, typically a computer or work station.

OFDM (Orthogonal Frequency Division Multiplexing) - A type of modulation technology that separates the data stream into a number of lower-speed data streams, which are then transmitted in parallel. Used in 802.11a, 802.11g, and powerline networking.

Packet - A unit of data sent over a network.

Passphrase - Used much like a password, a passphrase simplifies the WEP encryption process by automatically generating the WEP encryption keys for Linksys products.

Ping (Packet INternet Groper) - An Internet utility used to determine whether a particular IP address is online.

POP3 (Post Office Protocol 3) - A standard protocol used to retrieve e-mail stored on a mail server.

Port - 1. The connection point on a computer or networking device used for plugging in a cable or an adapter. 2. The virtual connection point through which a computer uses a specific application on a server.

PPPoE (Point to Point Protocol over Ethernet) - A type of broadband connection that provides authentication (username and password) in addition to data transport.

PPTP (Point-to-Point Tunneling Protocol) - A VPN protocol that allows the Point to Point Protocol (PPP) to be tunneled through an IP network. This protocol is also used as a type of broadband connection in Europe.

Preamble - Part of the wireless signal that synchronizes network traffic.

RJ-45 (Registered Jack-45) - An Ethernet connector that holds up to eight wires.

Roaming - The ability to take a wireless device from one access point's range to another without losing the connection.

Router - A networking device that connects multiple networks together, such as a local network and the Internet.

RTS (Request To Send) - A packet sent when a computer has data to transmit. The computer will wait for a CTS (Clear To Send) message before sending data.

Server - Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

SMTP (Simple Mail Transfer Protocol) - The standard e-mail protocol on the Internet.

SNMP (Simple Network Management Protocol) - A widely used network monitoring and control protocol.

Software - Instructions for the computer. A series of instructions that performs a particular task is called a “program”.

Spread Spectrum - Wideband radio frequency technique used for more reliable and secure data transmission.

SSID (Service Set IDentifier) - Your wireless network's name.

Static IP Address - A fixed address assigned to a computer or device that is connected to a network.

Static Routing - Forwarding data in a network via a fixed path.

Subnet Mask - An address code that determines the size of the network.

Switch - 1. Device that is the central point of connection for computers and other devices in a network, so data can be shared at full transmission speeds. 2. A device for making, breaking, or changing the connections in an electrical circuit.

TCP/IP (Transmission Control Protocol/Internet Protocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

Telnet - A user command and TCP/IP protocol used for accessing remote PCs.

TFTP (Trivial File Transfer Protocol) - A version of the TCP/IP FTP protocol that uses UDP and has no directory or password capability.

Throughput - The amount of data moved successfully from one node to another in a given time period.

Topology - The physical layout of a network.

TX Rate - Transmission Rate.

UDP (User Datagram Protocol) - A network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.

Upgrade - To replace existing software or firmware with a newer version.

Upload - To transmit a file over a network.

URL (Uniform Resource Locator) - The address of a file located on the Internet.

VPN (Virtual Private Network) - A security measure to protect data as it leaves one network and goes to another over the Internet.

WAN (Wide Area Network) - The Internet.

WEP (Wired Equivalent Privacy) - A method of encrypting data transmitted on a wireless network for greater security.

WINIPCFG - A Windows 98 and Millennium utility that displays the IP address for a particular networking device.

WLAN (Wireless Local Area Network) - A group of computers and associated devices that communicate with each other wirelessly.

Appendix F: Specifications

Standards	IEEE 802.3 (10BaseT), 802.3u (100BaseTX)
Ports	One 10/100 RJ-45 Port for Broadband Modem Eight 10/100 RJ-45 Switched Ports
Button	Reset
Cabling Type	Ethernet Category 5
LEDs	Power, QoS, Ethernet, Internet
UPnP able/cert	Yes
OS Support	Windows 98SE/Me/2000/XP
Network Protocols	TCP/IP, NetBEUI, IPX/SPX
Dimensions (W x H x D)	7.31" x 6.06" x 1.89" (186 mm x 154 mm x 48 mm)
Unit Weight	12.30 oz. (0.35 kg)
Power	External, 12V DC, 1 A
Certifications	FCC, CE, UPnP
Operating Temp.	0ºC to 40ºC (32ºF to 104ºF)
Storage Temp.	-20ºC to 70ºC (-4ºF to 158ºF)
Operating Humidity	10% to 85% Non-Condensing
Storage Humidity	5% to 90% Non-Condensing

Appendix G: Warranty Information

LIMITED WARRANTY

Linksys warrants to the original end user purchaser ("You") that, for a period of one year, (the "Warranty Period") Your Linksys product will be free of defects in materials and workmanship under normal use. Your exclusive remedy and Linksys's entire liability under this warranty will be for Linksys at its option to repair or replace the product or refund Your purchase price less any rebates.

If the product proves defective during the Warranty Period call Linksys Technical Support in order to obtain a Return Authorization Number. BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING. When returning a product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE. You are responsible for shipping defective products to Linksys. Linksys pays for UPS Ground shipping from Linksys back to You only. Customers located outside of the United States of America and Canada are responsible for all shipping and handling charges.

ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE WARRANTY PERIOD. ALL OTHER EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF NON-INFRINGEMENT, ARE DISCLAIMED. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to You. This warranty gives You specific legal rights, and You may also have other rights which vary by jurisdiction.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL LINKSYS BE LIABLE FOR ANY LOST DATA, REVENUE OR PROFIT, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE THE PRODUCT, EVEN IF LINKSYS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL LINKSYS' LIABILITY EXCEED THE AMOUNT PAID BY YOU FOR THE PRODUCT.

The foregoing limitations will apply even if any warranty or remedy provided under this Section fails of its essential purpose. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to You.

Please direct all inquiries to: Linksys, P.O. Box 18558, Irvine, CA 92623 USA.

Appendix H: Regulatory Information

FCC STATEMENT

This product has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

INDUSTRY CANADA (CANADA)

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

EC DECLARATION OF CONFORMITY (EUROPE)

In compliance with the EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC, and Amendment Directive 93/68/EEC, this product meets the requirements of the following standards:

- EN55022 Emission
- EN55024 Immunity

Appendix I: Contact Information

Need to contact Linksys? Visit us online for information on the latest products and updates to your existing products at:	http://www.linksys.com or ftp.linksys.com
Can't find information about a product you want to buy on the web? Do you want to know more about networking with Linksys products? Give our advice line a call at: Or fax your request in to:	800-546-5797 (LINKSYS) 949-261-8868
If you experience problems with any Linksys product, you can call us at: Don't wish to call? You can e-mail us at:	800-326-7114 support@linksys.com
If any Linksys product proves defective during its warranty period, you can call the Linksys Return Merchandise Authorization department for obtaining a Return Authorization Number at: (Details on Warranty and RMA issues can be found in the Warranty Information section in this Guide.)	949-261-1288